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A TERRA-COTTA RESIDENCE.



By permission of *The Clayworker*.

RESIDENCE OF W. D. GATES, HINSDALE, ILL.

MESSRS. JENNEY & MUNDIE, ARCHITECTS, CHICAGO.

WHEN "skeleton construction" is mentioned, Chicago appears to be naturally associated with the term. That system seems to have had its greatest development in this city, and, too, in an astonishingly short period of time. The first building to embody the idea was the Home Insurance Building, which was built in 1883. From the windows of its twelfth story can be counted to-day more than thirty office buildings, all ten or more stories high, at least ten of them

having their façades entirely of terra-cotta (save in some cases the first two or three stories, which are stone), and all of them employing in a greater or less degree terra-cotta cornices, band courses, sills, lintels, etc., in the construction of their exterior walls.

So far as Chicago is concerned the extended use of terra-cotta as a building material is due to the almost necessity for its application in "skeleton construction." THE BRICKBUILDER will publish details

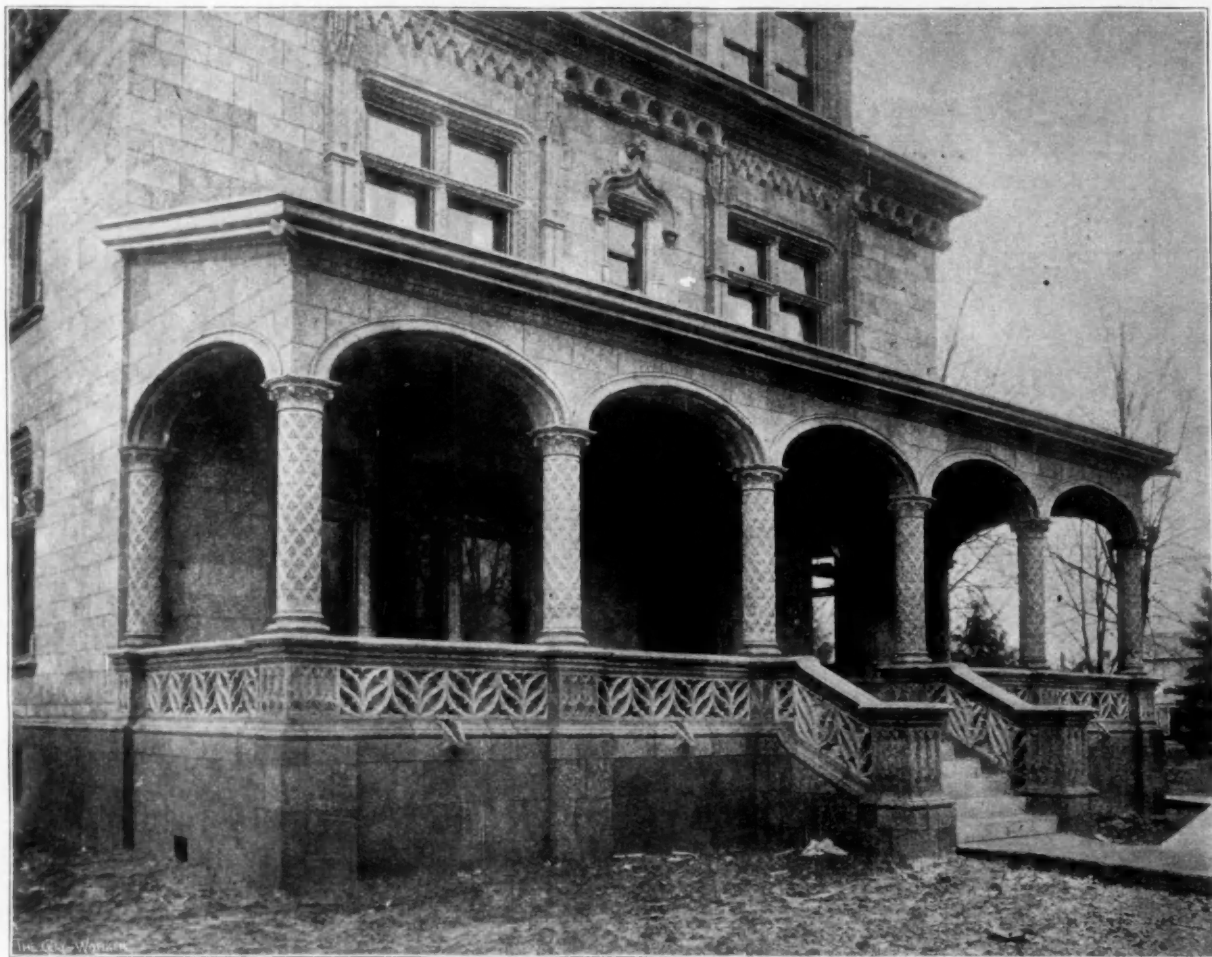
later, illustrating the methods of construction of modern office buildings varying from the old system of heavy walls through various stages to the latest most highly organized steel structure covered from sidewalk to roof with a veneer of terra-cotta.

Terra-cotta is such an adaptable material for veneering steel construction, it is so easily moulded to fit an angle or an I beam, that even when pressed brick curtain walls and piers are used the natural recourse is to terra-cotta for sills, lintels, and mullions. This we say from a constructive standpoint, without considering terra-cotta as a medium for architectural possibilities not yet realized.

The purpose of this article is to illustrate the use of terra-cotta for minor buildings, taking a residence as an example. What more

The foundation walls of this house are rubble limestone, coated outside with composition. The interior floors and partitions are ordinary wood joist and stud construction. The roof is of stained wood shingles, though by preference it would have been Spanish tile. The ridges, hip rolls, chimneys, and the entire exterior down to the ground level, are terra-cotta, excepting the steps, which are stone. Even the basement coal window sill, designed to be stone, was actually made in terra-cotta.

As regards the construction of this terra-cotta house, nothing could be more simple. The terra-cotta was made in the form of four-inch ashlar, and built up just ahead of an eight-inch brick backing to which it was firmly bonded by means simply of occasional brick pro-



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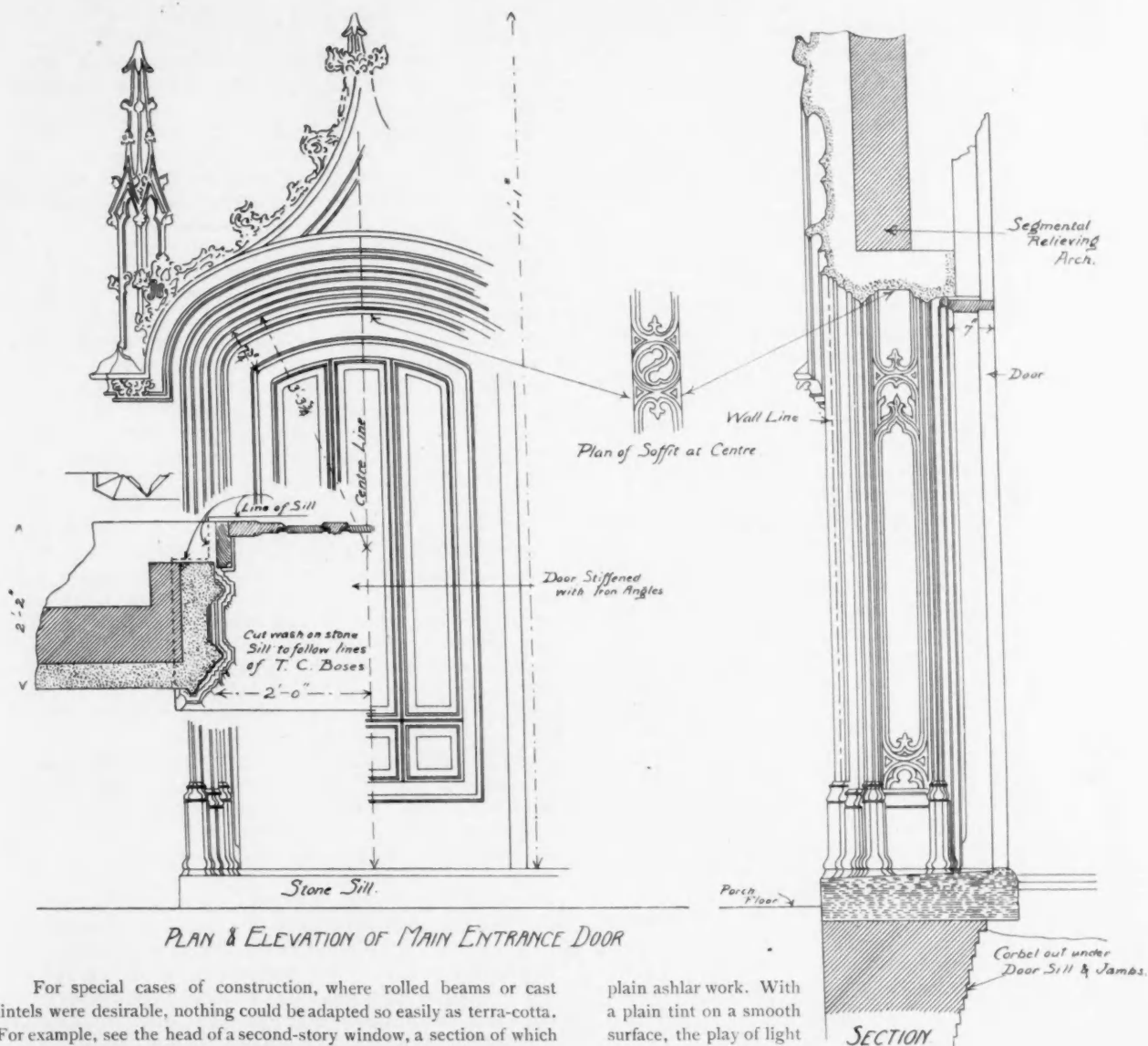
VIEW OF PORCH, RESIDENCE OF W. D. GATES, HILLSDALE, ILL. (See detail on Plate 25.)

MESSRS. JENNEY & MUNDIE, ARCHITECTS, CHICAGO.

natural than for the president of a terra-cotta company to say, as did Mr. W. D. Gates of the American Terra-Cotta Company: "Why shouldn't I build my house of terra-cotta, instead of stone or brick?" No good negative answer could be found to that question, and a terra-cotta house in the charming suburb, Hillside, was the result. Illustrations are published herewith showing the exterior appearance of the house, together with some details of its construction.

If this house were for any other than a terra-cotta manufacturer, the cost would be naturally one of the first questions. Terra-cotta facing at present costs more than pressed brick, but as compared with Buff Bedford, the cheapest, best, and most commonly used cut stone in Chicago, the same design, executed in terra-cotta, costs ten to twenty-five per cent less than in the Buff Bedford limestone.

jecting into the cellular backs of the ashlar. Each projecting brick was bedded in a corner of a cell, so that one side and one edge of each brick has a mortar bearing. With the exception of these bond brick, the hollow terra-cotta remained without filling, thus gaining all the advantage of a hollow wall. The plain blocks were made in sizes averaging seven inches and ten and a half inches in height, of alternate courses respectively, by about eighteen inches in length. A rule is to make the vertical dimension a multiple of two and a half inches, so that it will suit the ordinary brick backing. It is considered best to keep the greatest blocks within the dimensions of a two-foot cube, although the veranda column shafts were nicely made in single pieces (the shells being one and a half inches thick), and often still larger pieces are made, without too perceptible shrinkage and warping.



PLAN & ELEVATION OF MAIN ENTRANCE DOOR

For special cases of construction, where rolled beams or cast lintels were desirable, nothing could be adapted so easily as terra-cotta. For example, see the head of a second-story window, a section of which is shown in Fig. 1 (Plate 27). Where an arched head was allowable, the terra-cotta as well as the brick backing, each easily carried itself, — see third-story window in Fig. 1. The arches of the front veranda, where there is little superimposed weight, carry themselves; care being taken, of course, to counteract thrusts by means of suitable ties. Wood scantling were thrust down into the shafts of the corner columns (iron angles would have been better), which, acting as vertical beams, required no horizontal tie below the crown of the arches; the wood plate under the rafters being the only tie. The vertical tie rods, shown in Fig. 5 (Plate 27), were omitted. The veranda rafters were well bolted to the main walls. The veranda columns, arches, and balustrade is a nice piece of work. The balustrade required special care, as it is open work and finished both inside and outside. In the case of the rear porch or loggia (Fig. 6, Plate 27), where a heavy load had to be carried over the arch, steel beams could be used sunk into the voussoirs in a way quite impracticable with any other material than terra-cotta.

In deciding on the color of terra-cotta for his house, Mr. Gates tried a bold experiment with spotted or mottled surface. Spots of black, brown, and white were scattered thickly over a warm buff ground, giving a raindrop effect. All of the terra-cotta was treated in this way before going into the kiln. The general effect is surprisingly successful. Mr. Gates considers that this mottled effect and a combed or otherwise roughened surface are two important considerations for

plain ashlar work. With a plain tint on a smooth surface, the play of light reveals the slightest warping from a perfect plane and unpleasantly shows every inaccuracy of the joints. These objections, which might obtain in work on a fine residence to be viewed close to the eye, were entirely obviated by the above expedients.

Terra-cotta can be made in colors of a wide range (one contractor has a sample list of two hundred shades), from almost pure white through the yellows, grays, browns, to dark red; it is strong and yet light in weight; it can be bolted and anchored with ease; it can receive a semi-glaze which will keep out moisture without injuring its appearance; in short, terra-cotta is so "ductile," as some one has said, and it is so easily moulded to suit the designers' ideas in any style, that there is surely a pleasant future for it in residence work. The architect can visit the artistic modeller in the factory, criticise and change any of the ornament, and even have the individuality of his own thumb-nail appear in the surface of the finished building. It is to be hoped that the artistic standard of terra-cotta work may be put upon a high plane; that improved processes and constant cheapening will come rather in fire-clay floor arches, and partitions, so that fire-proof dwellings may become more common; that the sleeping family may be as safe at home as the insurance policy in the incombustible office building; and that then "burned earth" may be a thing of use, a thing of beauty, and a joy for a lifetime.

CHICAGO, April 11, 1894.

D. EVERETT WAID.

THE ART OF BUILDING AMONG THE ROMANS.*

Translated from the French of Aguste Choisy by

ARTHUR J. DILLON.

INTRODUCTION.

THE edifices of antiquity have been often described from an architectural point of view, but the details of their construction are still but vaguely known. When during the first years of the fifteenth century architects reinstated in honor the ruins of these long-forgotten monuments, they thought first of all to create a new art by imitating classic models. In accordance with this idea they chiefly observed the forms, the proportions, and the ornaments which they wished to revive by new applications; and the impulse given by them to archaeological research is felt up to the present time: their pupils, following the way opened to them, have turned over the soil of Italy and of Greece to continue the work of restoration thus begun. During three entire centuries discoveries have multiplied with extreme rapidity, but the spirit of investigation was not sensibly changed; it stopped at the surface of the monuments, without studying the skeleton, and the progress consisted principally in a better appreciation and a better knowledge of the exterior beauties of antique architecture.

To-day the results of so much labor are almost completely classified; the scattered fragments have resumed their places, and without great effort we can picture to ourselves the monuments of Rome and Athens in all the splendor of their primitive decoration. To complete the undertaking of our forerunners, it remains to make known the structure of the edifices of which they so learnedly interpreted the forms. Without doubt their writings throw some light on the means of construction; but the indications they offer in this regard are ordinarily very summary. They are given nearly always incidentally as isolated facts, as simple remarks connected by no theory. These general glimpses suffice to arouse our curiosity, but are far from satisfying it; they rather make us understand the utility of a special study in which the practical rules which were observed in antiquity would be collected and explained with more exactitude and development.

Such a review of abandoned methods would offer more than that undefined interest which is attached to the beginnings of all human industry. The construction, such as it is shown by the scattered details in descriptions of ruins, seems as ingenious as it is strong; it sums up a long and laborious experience consecrated by monuments which have undergone the test of centuries; it permits us to appreciate the extent and the nature of the resources made use of by the ancients, the development the applied sciences had attained in their day; in a word, the circumstances of antique construction form part of the social history of the peoples who have preceded us, and in more than one respect the questions they raise merit from us serious attention.

In the treatise which follows, I will touch on some of these questions, insisting especially on those which have relation to Roman art. With the Greeks the analysis of construction would be so involved with that of the architecture that it would be difficult to separate them so as to examine them apart; but the difficulty ceases when one examines the monuments raised under the domination of Rome. Their authors troubled themselves little enough about refinements of form; the arrangement of plans, the choice of methods of executions, was better suited to the entirely practical turn of their minds. As if they felt themselves incapable of embracing, as did the Greeks, architecture in its entirety, and following out together the various operations it comprises, they established a well-defined difference between structure, in which they were masters, and decoration, for which they affected a disdainful indifference. They left to others the task of ornamenting their edifices, charging themselves with the arrangement and building

of them, two problems which they made their own, treating them in a manner truly Roman. The way they imprinted, in the extent of their vast works, the traces of their character, needs, and customs has often been remarked; what they did in the art of building is less known; but here also one must expect to meet the stamp of their organizing genius, and the use of processes without precedent in accordance with the exceptional nature of their resources.

In fact, the vestiges of construction which date back to good epochs of Roman art show arrangements which it would be hard to find even indicated in monuments of another period; it suffices to observe one of those vaults which denote by their presence the points to which Roman empire extended, to be struck with the series of details which establish between ancient methods and our own such profound differences. These are on every hand: arches built in the thickness of the masonry; chains of supports of unusual forms; strengthenings of divers sorts, formerly hidden in the middle of stone work or veiled by plaster, which the decay of the edifices reveals to us by portions often disfigured or incomplete. What functions did these curious ruins fill? Of what use were these big, roughly constructed arches swallowed up in the masses of the vaults, these skeletons of brickwork which often checker the surfaces? By what rules and with what object were these members of this plastered framework combined in the body of the masonry, always light, put up with little trouble, hastily, and without precision? Nothing in our own construction corresponds to these auxiliary works; and nevertheless, judging their importance by the universality of their employment, they seem to have played a capital part in the economy of Roman building. Without doubt they were not there for ornament; they were too irregular and put up with a too evident haste for one to have thought of leaving them apparent; they constituted a kind of interior framework for the building where practical ideas were manifested the most freely and the most sincerely because there were no exigencies of architecture to complicate or hinder their expression. Thus the rules of the art of building are written, so to speak, in these singular works; and if one had to choose certain details to characterize the Roman's methods of construction, no partial study of their edifices would be better suited to this object than that of the ribs with which they braced their vaults.

These ideas struck me forcibly the day I found myself for the first time in the presence of the ruins of ancient Rome, and they have served as a point of departure for my researches among ancient monuments. It seems to me that the history of these monuments, regarded from the point of view of an engineer, could easily be written and set forth without confusion, if to establish a system in the work one profited by the close connection which in general joins the details of Roman construction to the principles which govern the building of vaults. Especially placing myself at this point of view, and, moreover, guided and sustained by the counsels and good wishes of a master who united to the science of an engineer the talents of an architect, I endeavored in a series of voyages which the *administration des ponts et chaussées* kindly encouraged, or prescribed, to gather together the principal documents likely to throw light on the technical questions which relate to the monuments of Roman art. It is the results of this research which I publish to-day. Without undertaking to reconstruct in all its parts a lost system of construction, I shall try at least to describe various details at present too imperfectly comprehended, to give an account of processes of which the significance has seemed clear to me, and to simply call attention to those whose meaning I have not fully grasped.

To tell the truth, I have thought less of writing a history of construction among the ancients than of furnishing the documents for such a work; and I had before all to be on my guard, in a case where observation is so often so delicate a matter, against documents of doubtful origin and capable of misleading a critic. Therefore I have imposed on myself the express condition of citing no examples without having personally established their exactitude or without clearly indicating the sources from which I have drawn them. Sometimes it has been necessary to complete my observations by hypotheses, but in no

* See advertising page 12.

case have I done this without making the point where observation ceases and hypothesis begins very clear.

As to theoretic explanations, I should have liked to have surrounded them with the same guarantees, confining myself to advancing only those confirmed by ancient writings; but this verification has not always been possible and the writer on whom I counted most to guide me has too often failed me. Vitruvius speaks of vaults only incidentally, in a vague manner, and with a brevity which is but little in accord with the importance of the subject. It is, in fact, because at his time vaulted construction had by no means reached the development it afterwards attained; no vault of very great span and built on the system of rubble masonry, which later was so widespread, can with certainty be attributed to an epoch anterior to that of Vitruvius; the author of the only ancient treatise on construction remaining to us assisted only toward the end of his life at those colossal enterprises which recall to us the names of Augustus and Agrippa, and which marked the beginning of a new era in Roman architecture; he himself had no part in the magnificent impulse which produced the Baths of Agrippa and the Pantheon of Rome, and his book, the work of his old age, offers us less a picture of the innovations of a contemporary epoch than a souvenir of the procedure in use during the last days of the Republic, — a sort of return toward the methods he had applied in the course of his long career.

Vitruvius excepted, the ancient writers do not treat construction with enough detail for one to have reason to expect from them anything really useful. Pliny, given above all to speculative observations, develops less the methods followed in the use of materials than the natural history of the materials themselves. Frontinus regards construction more as a director of works than as an architect; and though he may often mention vaulted works built under his direction, he nowhere enters into the details of the process. There still remain, perhaps, writings on Roman agriculture or on military arts, in which are found short descriptions relative to building; but the constructions mentioned have too special an object, and the writings, which treat of them briefly, can only throw a doubtful light on the general principles of practical architecture. Moreover, the rare allusions which they make to ordinary methods are very obscure, and many would remain, I think, unintelligible, if the ruins were not there to serve as commentaries.

The almost absolute silence of writers forced me to explain theoretically the facts I have observed; but the explanatory hypotheses have fortunately shown characteristics of great truth, and the perfect clearness which the ancients have shown in all their applications of the art of building fills out, to a certain extent, the blanks in the treatises they have left us. Strictly economical calculations were to me manifestly evident as the principal cause of the various characteristics of ancient construction, and in spite of the very natural distrust with which I was inspired by such an hypothesis applied to the monuments of the great Roman power, it constantly forced itself on me at the end of my studies as the inevitable conclusion to which I must come in spite of myself.

Thenceforth I perceived that one accustoms himself too easily to look upon the Romans as a people who, disposing of immense riches, had never to consider material means, and who could disdain without a scruple the expedients which are sometimes suggested to us by the insufficiency of our resources. The passion for large things assuredly was not a stranger to their enterprises, but the genius of the Romans knew how to reconcile the vastness of projects with a facility of execution. The more closely I examined their monuments, the more it seemed to me impossible not to recognize the employment of a thousand artifices, having for their object, if not the reduction of skilled labor, at least a simplification of it. While architects have aimed in their conceptions of the ensemble at a majesty of effect and an endurance worthy of the power and eternity of the Roman people, an evident eye to rigorous saving guided them in the execution of every part; they always aspired to achieve by the use of processes, as easy as they were simple, the double merit of perfect solidity and incomparable grandeur.

This observation led me to look at Roman construction as having a practical aspect I did not at first suspect; as the Romans sought economy in their edifices perhaps we might gain something in reviving some of their processes. Every day we borrow from the ancients forms of decoration; apparently they have something to teach us in the art of building as well, and the history of their edifices more completely known may interest the future of the art of construction as well as that of architecture. This conjecture seems incontestable, but it is not absolute, and to appreciate the importance and degree of fidelity which in these days would be allowable in the imitation of ancient processes one should take account of the differences made by the interval of fifteen centuries between the Roman resources and our own. I shall not speak here of the slaves the Romans so frequently employed in building; they had, especially in the provinces, a resource still greater and more ordinary, which was to use on the public buildings that part of the population of the empire subject to public labor. They thus recruited in *corvées* as many laborers as they wished to employ. But these improvised workmen, torn from their habitual occupations and dragged by force to the works, were generally found very ill prepared for their new rôle. The Romans did not hesitate to put them to any fatigue whatever, but they were obliged to apportion the difficulties of their tasks according to their inexperience; it was necessary to demand from them purely physical efforts only, and to reduce as far as possible the part left to their intelligence and dexterity. Thanks to the progress of civilization, such resources and the methods which facilitated their employment are now forbidden us.

Moreover, the methods employed by the Romans have not all this exceptional character; they do not all present such close correlation with a social system which ceased long ago to weigh upon the world, and besides these methods of execution, the study of which henceforward belongs exclusively to history, we find among the Romans quite a number of artifices of less special character which may be employed in our own time as they were at the time of the *Césars*. Such are the expedients which the ancients invented, as we shall see, to reduce the importance of the auxiliary works; centring, for example, or scaffolding, and, in general, those expensive accessories which hamper the progress of the work and increase its price. The adoption of any complex processes or roundabout ways was repugnant to the Roman mind. Physical labor cost them little, and nowhere in the durable parts of their buildings have they been saving of it, but nowhere have they expended it for temporary work without regret. The rule which they followed was, on the contrary, to utilize for permanent work, and in the simplest way, all the resources drawn on for the construction of their edifices; this very elementary rule will account for the greater part of the artifices peculiar to Roman art which we are to show.

So, independent of the methods whose employment we cannot renew without placing ourselves in formal opposition to the economic system of our times, we meet in the old traditions of the art of building with processes whose merit does not result exclusively from their appropriateness to the people who used them, but whose generality permits them to be applied to new uses. Still the general principles followed by the Romans are very few in number; the reapplication of the resultant processes will always be subjected to certain restrictions, and to use them for our purposes it will often be necessary to modify them more or less profoundly. But even if imitation should be forbidden us, these processes are well worth studying. One who applied himself exclusively to their form would have but an imperfect knowledge of the monuments of antiquity, and a description of these monuments, from the point of view of construction, will aid at least in filling up some of the gaps in the history of a justly celebrated architecture.

(To be continued.)

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BRICK AND MARBLE IN THE MIDDLE AGES.

(Continued.)

CHAPTER IV.

"But now 'tis pass'd,
That turbulent chaos; and the promised land
Lies at my feet in all its loveliness!
To him who starts up from a terrible dream,
And lo, the sun is shining and the lark
Singing aloud for joy, to him is not
Such sudden ravishment as now I feel,
At the first glimpses of fair Italy." — Rogers.

CHIAVENNA — LAKE OF RIVA — COLICO — GRAVIDONA — LAKE OF
COMO — VARENNA — STELVIO PASS — LECCO — BERGAMO —
BROLETTO — CHURCHES — CASTLE OF MALPAGA.

THE situation of Chiavenna is eminently beautiful: in a deep valley surrounded on all sides by mountains whose slopes are covered with soft and luxuriant foliage of oak and chestnut, and where every available open space is devoted to trellised vineyards, it contrasts strongly with the pine-covered hills so lately passed on the northern slopes of the Alps; placed, too, at the confluence of two streams, — the Meira and the Lira, — it rejoices in the constant, rushing sound of many waters.

It was only necessary to move out of the shade of our hotel into the melancholy piazza in which it stands, to discover that an Italian sun lighted up the deep-blue sky; and a walk to the principal church, dedicated in honor of St. Lawrence, a stroll through the narrow streets, and a rather toilsome ascent through a vineyard formed upon a rock which towers up behind a kind of ruined castle, and from which a capital view is obtained of the singular and beautiful *cul-de-sac* in which the town is planted, sufficiently convinced us of its power.

The church of St. Lawrence is entered from a large, oblong cloister, in one angle of the space, enclosed by which rises a tall campanile, its simple form, and its arcaded belfry full of musical bells, contrasting well with the outline of the hills, which overhang and hem it in. On the east side of the cloister are the church, an octagonal baptistery, and a bone-house, all ranged side by side, and opening into it, and the latter curious as an example of the extent to which the people of Chiavenna amuse themselves by arranging skulls and arm bones into all kinds of religious and heraldic devices, and with labels to mark the names of their former owners. The *tout ensemble* is picturesque in its effect, and the cool, pleasant shade of the cloister, with the view of the church and its tall campanile, and irregularly grouped buildings looking brilliantly white in the clear sunshine, was very pleasing.*

* Probably most travellers who pass by Chiavenna are now on their way to or from the Engadin, by the beautiful Maloja Pass. They will do well before they reach the top of the Pass to notice on their left the ruined remains of a Gothic chapel of the fifteenth century, which may, I suppose, aspire to the honor of being at a greater height above the sea than any other Gothic church in Europe. Its architectural merit is not great, but still it has a certain value, as showing how well a simple little Gothic church looks among the wildest mountain scenery.

Italian beggars, persevering, and, at any rate in appearance, very devout, did their best to annoy us here and everywhere when we ventured to stop to examine or admire anything; and Italian beggars are certainly both in pertinacity and in filth about the most unpleasant of their class.

My voiturier gave me a lesson worth learning, and not perhaps unworthy of note for other unsuspecting travellers. We had a written contract to Chiavenna, and thence to Colico he had agreed verbally to take us for a certain sum; before we started I found, however, that he intended to charge us three times as much as we had agreed upon, and as very luckily we found a diligence on the point of starting, we secured places in the cabriolet at its back, from which we had the

best possible position for seeing the views, and so left him in the lurch, with divers admonitions to behave himself more honestly for the future.

At ten we left, and had a very enjoyable ride to Colico. The valley, however, bore sad traces of the havoc made by the inundations of the Meira, and of the storm of the previous night. We soon reached the shores of the little Lake of Riva, along whose banks our road took us sometimes in tunnels, sometimes on causeways built out into the water, until at last we reached the valley up which runs the Stelvio road, and then, after passing along the whole length of a straight road lined on each side with a wearisome and endless row of poplars, we were at Colico. Here we prudently availed ourselves of the opportunity of an hour's delay in the departure of the boat for an early dinner, and, then embarking, waited patiently the pleasure of our captain.

The scenery of Lake Como has been so often extravagantly praised that I was quite prepared to be disappointed; but for the whole distance from Colico to Lecco it is certainly on the whole more striking than any lake scenery I have seen. The mountains at its head are extremely irregular and picturesque, and

throughout its whole length there is great change and variety. In this respect it contrasts favorably with most other lakes, and I certainly think that not even in the Lake of Lucerne is there any one view so grand as that which one has looking up from within a short distance of the head of Como over the Lake of Riva to the mountains closing in the Stelvio, and rising nobly above the sources of the Meira and the Lira.

Somewhat, too, may be said of the innumerable villages and white villas with which the banks of the lake are studded; they give a sunny, inhabited, and cheerful feeling to the whole scene, and, reflected in the deep-blue lake, in those long-drawn lines of flaky white, which are seen in no other water to such perfection, add certainly some beauty to the general view.

One of these villages, Gravidona, within half an hour's sail of Colico, ought not to be left unvisited by any one who cares about architecture.

Close to its little harbor stand two churches, side by side, one



BAPTISTRY, GRAVIDONA.

an oblong basilica, the other a baptistery of, as it seems to me, such great interest that I give illustrations both of its plan and of its exterior. It will be seen that the dimensions are small, the total internal width being less than forty feet, whilst the design of the east end is most ingeniously contrived so as to give no less than five eastern apsidal recesses. There are two stair turrets in the wall, on each side of the western tower, which lead up to a sort of triforium passage, which is formed behind an arcade in the side wall of the church, and one of them leads also to the first floor of the tower. The triforium consists of an arcade of seven arches in each side of the wall. The three small apses at the east have each their own semi-dome, and the chancel, as well as all the other apsidal recesses, are similarly roofed. All the walls retain more or less traces of old paintings, the Coronation of the Blessed Virgin occupying the principal apse, and the Last Judgment the west wall. The whole church is built in white marble and black limestone, used in courses, or stripes, with extremely good effect.

The roof of this baptistery is of wood. The exterior is best explained by reference to my drawing of the west front. It stands on a charming site, with a background of lake and mountain, such as one seldom enjoys. There is a contrast here, which strikes one very much, between the ingenious skill of the planning of such a building as this and the rudeness of the execution of the details. I know nothing as to the history of Gravidona; but it looks as though the plan came from the hands of men who knew something of the church of San Vitale at Ravenna, whilst its execution was left to the rustic skill of the masons of the country.

The baptistery is dedicated to St. John the Baptist. Close to it, as I have said, stands the church of San Vincenzo, which, though Romanesque in its foundation, has been much modernized, and is now mainly interesting on account of the exquisite examples of late fifteenth century silversmiths' work which still enrich its sacristy. Conspicuous among these is a silver processional cross. This cross is nearly two feet across the arms by three feet in height from the top of the staff. There is a crucifix on one side and a sitting figure of Our Lord on the other, figures of SS. George, Vincent, Sebastian, Christopher, and Victor, and Our Lord on the base or knop, and half-figures of the Evangelists on the arms of the cross. The ornaments consist of crockets bent and twisted, of blue enamels, filigree work, nielli, and turquoises set in the centre of dark-blue enamels. It is, in short, a piece of metal work which might well make a modern silversmith run down swiftly into the lake and drown himself in despair at the apparent impossibility in these days of rivalling such a piece of artistic and cunning workmanship, in spite of all our boasted progress!

Not much less splendid is a chalice of about the same age. It is ten and three-quarter inches high, has a plain bowl, but knop, stem, and foot all most richly wrought with figures, niches, and canopies, and the flat surfaces filled with fine blue and white Limoges enamels. The paten belonging to this chalice is very large, nearly ten inches across, and quite plain.

Half the passengers on the steamboat were, of course, Austrian soldiers and officers, the other half English or Americans, either resident at or going to Como. We, however, stopped on the way, and, leaving the steamboat in the middle of the lake, after a row of about twenty minutes found ourselves at Varenna, a village exquisitely placed just where the three arms of the lake — the Como, the Lecco, and the

Colico branches — separate, affording, whether seen from here, from Bellagio, or from Cadenabbia, the most lovely lake views it has ever been my good fortune to see.

Here we had what seemed likely to be an endless discussion upon the relative merits of a four-oared boat and a carriage as a means of conveyance to Lecco. We inclined to the latter; but, leaving the matter in the hands of an active waiter, we busied ourselves with eating delicious fruit, admiring the tall cypresses growing everywhere about the shores of the lake, and watching the exquisite beauty of the reflections of Bellagio and the opposite mountains on the smooth bosom of the water.

We were soon off again, and well satisfied to find ourselves trotting rapidly along the well-kept Stelvio road, instead of dragging heavily and slowly along, as one always does, with a Swiss voiturier; soon, however, we were to find that our driver was an exception to the Italian rule, and that he who wishes to travel fast must not expect to do so with vetturini.

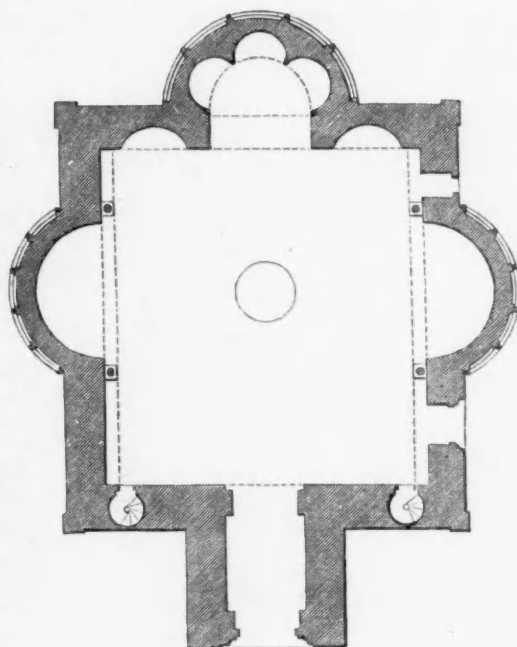
The churches which we passed were in no way remarkable; they all had campanili, with the bells hung in the Italian fashion in the belfry windows, with their wheels projecting far beyond the line of the wall; but they all seemed alike, uninteresting in their architecture, so that we were in no way sorry to pass them rapidly on our way to Lecco. This eastern arm of the lake, though of course much less travelled than the rest of its course, is very beautiful, and its uninhabited and less cultivated looking shores, with bold cliffs here and there rising precipitously from the water, were seen to great advantage, with the calm, unrippled surface of the lake below, and the sky just tinged with the bright light of the sun before it set above.

Lecco contains nothing to interest a traveller; we had an hour to spend there before we could get fresh horses to take us on to Bergamo, and wandered about the quaint-looking streets, which were full of people — some idly enjoying themselves, others selling luscious-looking fruit. We went into a large church not yet quite completed; it was Renaissance in style, almost of course, and on the old plan, with aisles, but very ugly notwithstanding. In the nave was a coffin, covered with a pall of black and gold; six large candles stood

by it, three on either side, and two larger than the others on each side of a crucifix, at the west end. The whole church revelled in *compo*, inside and out, and there was external access to a wretched bone-house in a crypt.

Leaving Lecco, we had a long drive in the dark to Bergamo; the night was very dark, but the air was absolutely teeming with life, and sounds of life; myriads of *cicale* seemed to surround us, each giving vent to its pleasure in its own particular note and voice, with the greatest possible determination; and had I not heard them, I could scarcely have believed it possible that such sounds could be made by insects, however numerous they might be. We changed horses at a village on the road, and went on rapidly. The old town of Ponte San Pietro was passed, having been taken at first to be Bergamo, and remembered by the sound of a troop of men singing well together as they passed us in the dark in one of its narrow streets, awakening with their voices all the echoes of the place, which, till then, had seemed to us to be supernaturally silent. It was eleven o'clock before we reached Bergamo, and, tired with our long day's work, we were soon in bed.

A prodigious noise in the streets before five o'clock the next



PLAN — BAPTISTERY, GRAVIDONA.

morning gave us the first warning that the great fair of Bergamo was in full swing; sleep was impossible, and so we were soon out, enjoying the busy throng which crowded the streets of the Borgo, in a before-breakfast walk; the crowd of women selling fruit, the bright colors of their dresses, the rich tints of stuff hung out for sale, the display of hairpins and other ornaments in the innumerable silversmiths' shops, and the noisy, laughing, talking people who animated the whole scene, made the narrow arcaded streets of the busy place most amusing.

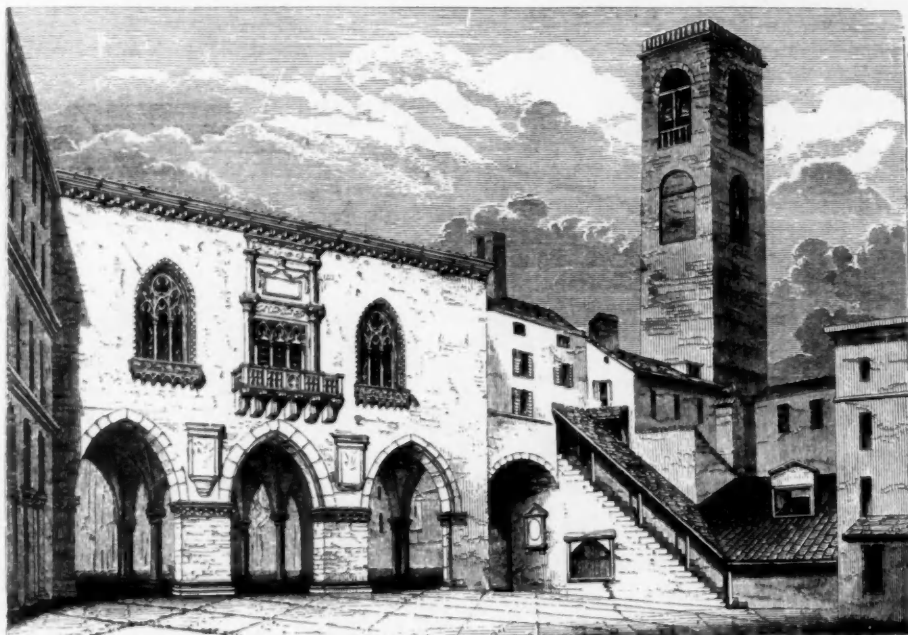
After breakfast we started at once for the Città, as the old city of Bergamo is called. It stands on a lofty hill overlooking the Borgo San Leonardo, within whose precincts we had slept, quite distinct from it and enclosed within its own walls. The ascent was both steep and hot, but the view at the entrance gateway of the Città over the flat Lombard country was very striking, and well repaid the labor of the ascent. This vast plain of bluish-green color, intersected in all directions by rows of mulberry-trees and poplars, diversified only by the tall white lines of the campanili which mark every village in this part of Lombardy, and stretching away in the same endless level as far as the eye could reach, was grand, if only on account of its simplicity, and had for us all the charm of novelty.

Through narrow and rather dirty streets, which do little credit to the cleanly habits of the Bergamask nobility, to whom it seems that the Città is sacred, and whose palaces are, many of them, large and important buildings, we reached at last the Piazza Vecchia, around which is gathered almost all that in my eyes gives interest to Bergamo.

Across the upper end of the Piazza stretches the Broletto, or town hall, supported on open arches, through which pleasant glimpses are obtained of the cathedral and church of Sta. Maria Maggiore, which last is the great architectural feature of the city.

But we must examine the Broletto before we go farther. And first of all, its very position teaches a lesson. Forming on one side the boundary of a spacious piazza, on the other it faces, within a few feet only, the church of Sta. Maria Maggiore, and abuts at one end upon the west front of the Duomo. It is to this singularly close—even huddled—grouping that much of the exquisite beauty of the whole is owing. No doubt Sta. Maria and the original cathedral were built first, and then the architect of the Broletto, not fearing—as one would fear now—to damage what has been done before, boldly throws his work across in front of them, but upon lofty open arches, through which glimpses just obtained of the beauties in store beyond make the gazer even more delighted with the churches when he reaches them than he would have been had they been all seen from the first. It is, in fact, a notable example of the difference between ancient grouping and modern, and one instance only, out of hundreds that might be adduced from our own country and from the Continent, of the principle upon which old architects worked; and yet, people, ignorant of real principles in art, talk as though somewhat would be gained if we could pull down St. Margaret's, in order to let Westminster Abbey be seen; whereas, in truth, the certain result would be, in the first place, a great loss of scale in the Abbey seen without another building to compare it with and measure it by; and in the next, the loss of that kind of intricacy and mystery, which is one of the chief evidences of the Gothic spirit. Let us learn from such examples as this at Bergamo that buildings do not always require a large open space in front of them, so that they may be all seen and taken in at one view, in order to give them real dignity.

The whole design of the Broletto is so very simple as to be almost chargeable with rudeness of character. The ground on which it stands is divided by columns and piers, the spaces between them being all arched and groined. Towards the Piazza three of these arches, springing from rather wide piers, support the main building, and another supports an additional building to the west of it. Above the three main arches are three windows of which that in the centre, though very much altered, still retains a partially old balcony in front, and was evidently the Ringhiera, from which the people standing in the Piazza were wont to be addressed by their magistrates. The windows on either side are very similar in their design and detail; their tracery is of fair middle-pointed character; and the main points in which they strike one as being different from English work are the marble shafts with square capitals in place of monials, a certain degree of squareness and flatness in the mouldings, and the very pronounced effect of the sills, which have a course of foliage and moulding, and below this of trefoiled arcaded ornament, which in one shape or another is to meet the traveller everywhere in Northern Italy; either,



BROLETTO, BERGAMO.

as here, hanging on under the sills of windows, or else running up the sides of gables, forming string-courses and cornices, but always unsatisfactory, because unmeaning and unconstructional. The origin of this sort of detail is to be found in the numerous brick buildings not far distant, where the facility of repeating the patterns of moulded bricks led (as it did in other countries also) to this rather unsatisfactory kind of enrichment. The detail of the arcades supporting the upper part of the building is throughout bold and simple, and I should say of the thirteenth century; the bases are quite Northern in their section, the caps rather less deep in their cutting, but still in their general design, and in the grouping of tufts of drooping foliage regularly one above the other, reminding one much of Early French work, though they are certainly not nearly so good as that generally is. There is a flatness about the carving, too, which gives the impression of a struggle, in the hand of the carver, between the Classic and Gothic principles, in which the latter never quite asserted the mastery. The lesson to be learnt from such a building as this Broletto appears to me to be the excessive value of simplicity and regularity of parts carefully and constructionally treated; for there are no breaks or buttresses in the design, and all its elements are most simple, yet nevertheless the result is beautiful.

To the west of the Broletto is a good open staircase (much like

that in the Piazza dei Signori at Verona), forming a portion of one side of the Piazza, and leading to the upper part of the buildings, and, I think, to the great clock-tower, which, gaunt and severe in its outline, undecorated and apparently uncared for, rears its great height of rough stone wall boldly against the sky, and groups picturesquely with the irregular buildings around it. I have omitted to notice that the whole of the Broletto, with the exception of the window shafts, is executed in stone, and without any introduction of colored material, so that it in no way competes with the exquisite piece of colored construction which we have next to examine, immediately behind it:

A few steps will take us under the open-arched and cool space beneath the Broletto, to the face of the north porch and baptistry of Sta. Maria Maggiore. This is a

very fine early Romanesque* church, but with many additions and alterations on the outside, and so much modernized inside as to be quite uninteresting to any one who thinks good forms and good details necessary to good effect. The plan is cruciform, with apses to the choir, on the east and west sides of the south transept, on the east of the north transept, and at the west end of an additional north aisle; in all no less than five apsidal ends. The nave is of three bays with aisles, and to each transept have been added, in the fourteenth century, porches, thoroughly Italian in their whole idea, and novel to a degree in their effect upon an English eye.

A domed chapel, erected as a sepulchral chapel by Bartolomeo Colleoni in the Renaissance style, on the north side of the nave, is most elaborately constructed of colored marbles. The effect is too bizarre to be good; there is an entire absence of any true style in its design; and there is nothing which makes it necessary to criticise it with much minuteness.

The best and most striking feature in the whole church is the north porch, a most elaborate structure of red, gray, and white marble, to which a drawing without color can hardly do justice. It is supported upon detached marble shafts, whose bases rest upon the backs of rather grand-looking lions, curiously grouped with children and cubs. Above the arches which rest upon these shafts, and which, though circular, are elaborately cusped, is another stage divided by columns and trefoiled arches into three spaces, the centre of which is occupied by a noble figure of a certain Duke Lupus on horseback, with a saint on either side in the other divisions. All the shafts except those in the upper division are of red marble; the highest stage of all is entirely of gray marble; in the middle stage all the moulded parts are of red, and the trefoiled arches and their spandrels of gray marble; the space at the back of the open divisions and the wall over the main arches of the porch are built in courses of red and white marble. All the groining is divided into diamond-shaped panels, composed alternately of black, red, and white marble, all carved in the same kind of pattern. In the great arch of the

porch the outer moulding is of red marble, and all the cusping of gray. The construction of the whole is obviously very weak, and depends altogether for its stability upon iron ties in every direction.

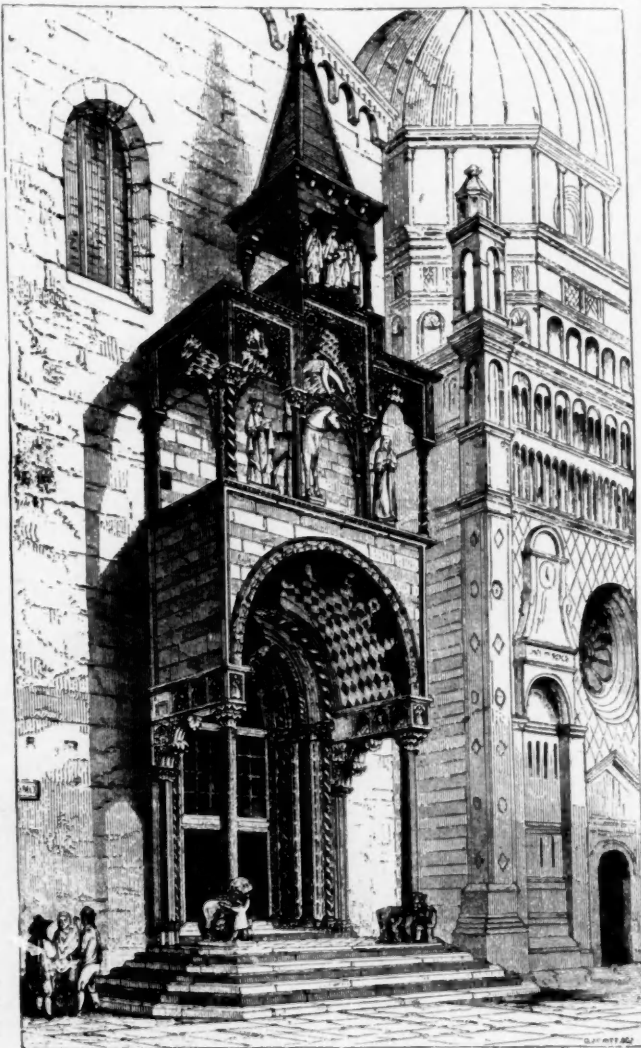
The approach to the porch, by seven steps formed alternately of black and white marble, increases the impressiveness of the grand doorway, in front of which it is built, the whole of which is of white marble, whose carved surfaces and richly moulded and traceried work have obtained a soft yellow color by their exposure to the changing atmosphere, and are relieved by one—the central—shaft being executed in the purest red marble. There are three shafts in each jamb, carved, twisted, or moulded very beautifully. These shafts are set in square recesses, ornamented, not with mouldings but with

elaborate flat carvings, in one place of saints, in another of animals, and with foliage very flat in its character, and mainly founded on the acanthus.

To an English eye these columns in the doorways are some of the most charming features of Italian architecture; but they must be always looked at as simply ornamental, and not as constructional features; and perhaps in all doorways the shafts, being really incapable of supporting any considerable weight, would be better if, by their twisting and moulding, it were clearly shown that their architect meant them to be simply ornamental. In the Bergamo doorway the spaces between the shafts are so strong in their effect, though carved all over their surface, that any lightness in the columns themselves is amply atoned for. Such a work as this northern porch at Bergamo is indeed a great treat to an English architect, teeming as it does with fresh and new ideas, and in a small compass showing so many of the radical points of difference between Northern and Southern Gothic, and at the same time offering so beautiful a study of constructional coloring, that it is impossible to tire of gazing at it.

The porch to the south transept is of a simpler but somewhat similar design. Both are placed against the western half of the gable against which they are built, with a pleasant ignorance of those new-fangled views of regularity of plan which are the curse of modern

architects. This southern porch is round-arched, and fitted exactly to the doorway which it shields. Its outer arch is carried on detached shafts resting on the backs of monsters, and it is mainly constructed of black and white marble. It is of only one stage in height, and has a deep cornice enriched with a series of niches with figures. An inscription below the cornice gives the date as 1360.* Above the porch, but independent of it, is a lofty monumental pinnacle corbelled out from the wall, and richly sculptured with crocketed pinnacles and gablets. When the church is entered, the reason for the apparently eccentric position of the porches is seen. They were so placed to



NORTH PORCH, STA. MARIA MAGGIORE, BERGAMO.

* The church was built in A. D. 1134 by Maestro Fedro.

* * * MCCCLX MAGISTER JOHANNES FILIUS C. DNI VGI DE CAMPILIO FELICIT. HOC OPUS. This Giovanni da Campione was one of a family of architects of much celebrity. See their genealogical tree in "Italian Sculptors," p. 106.

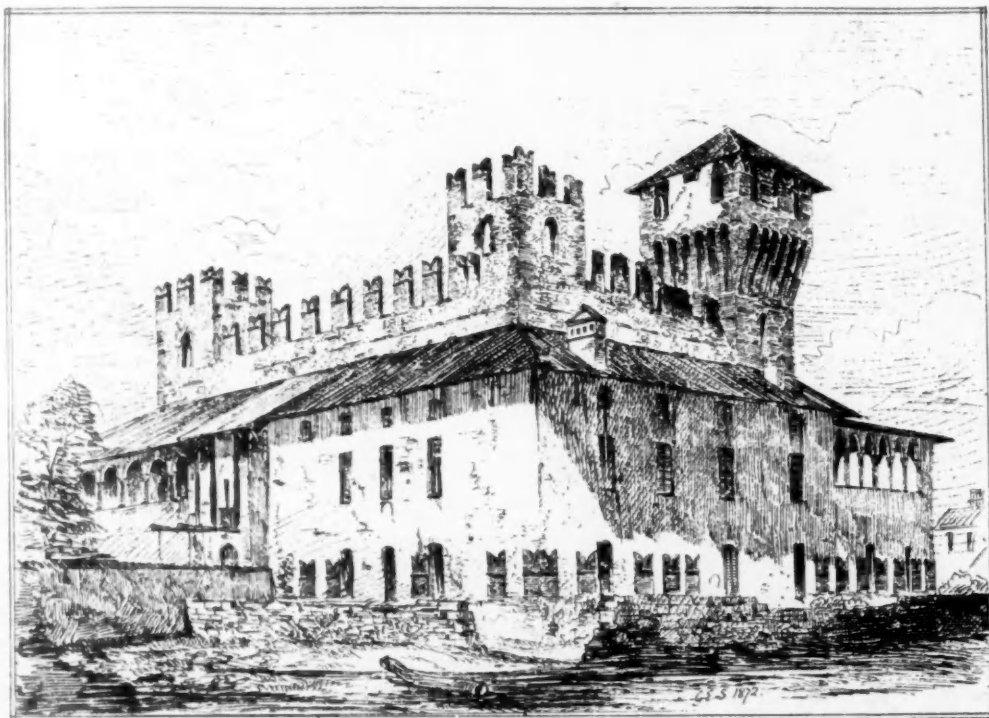
give more space for the altars to the east of the transepts, and their successful effect is good evidence that no artist need ever distress himself about a want of regularity, if it is the result of a little common sense attention to convenience in the arrangement of his plan.

The southern side of the church gives a very fair idea of what the general character of the original building of 1134 was. The windows were very plain, the walls lofty, the roof flat, and ornamented with corbel-tables up the gables and under the eaves, and pilasters were used at intervals instead of buttresses. There is a central octagonal lantern which may be old, but which is entirely modernized. The most interesting remains are the various apses already mentioned. They are of two divisions in height, the lower adorned with very lofty, boldly moulded arcades, above which is an elaborate cornice, and above this again a low arcade on detached shafts, behind which the walls are considerably recessed to form galleries, which produce a very deep shadow. The capitals are elaborately carved, and the upper cornice is again very rich. Altogether, little as remains unaltered of the old fabric, it is enough to give an idea of a very noble and interesting phase of art. Near a doorway into the north chancel aisle the

mind as has the beautiful campanile to whose grace so much of the charm of Verona is due.

The cathedral at Bergamo, which is close to the Broletto and Sta. Maria, may be dismissed in a word. It has been rebuilt within the last two hundred years, and appeared to be in no way deserving of notice. In a courtyard on its north side is a small detached polygonal baptistery, founded in 1275, which must have been very interesting. It is all built of marble, and richly adorned with shafts; but so far as I could see every portion of it has been renewed within a few years. Beside Sta. Maria Maggiore and the Broletto, we found little to see. Two churches—one in the Città, and another, desecrated, in the Borgo—have very good, simple pointed doorways, with square-headed openings and carved tympana; but beyond these we saw scarcely any trace of pointed work. We had a luxuriously hot day in Bergamo, and as we sat and sketched the Broletto, a crowd, thoroughly Italian in its composition and proceedings, gathered round us and gave us a first lesson in the penance which all sketchers must be content to undergo in Italy. Before long I found that my only plan was to start an umbrella as a defence, both against the sun and the crowd, and this, though not entirely successful, still effected a great improvement.

The walk down the hill to the Borgo was more pleasant than the climb up, and we were soon at our inn again, and then, after a most delicious luncheon of exquisite fruit and coolest lemonade, concluded by a very necessary dispute with our landlord about the amount of his bill, ending, as such disputes generally do in Italy, with a considerable reduction in the charge and the strongest expressions of regard and good wishes for our welfare on our way, we mounted our



CASTLE OF MALPAGA.

external walls have traces, faint and rapidly decaying, of some very exquisite frescoes, or, more probably, *tempera* paintings.

The steeple is in a most unusual position,—east, namely, of the south transept,—not less, I believe, than some three hundred feet in height, of good and very simple pointed character, without any approach to buttressing, and remarkable as having an elaborately arcaded string-course a few feet below the belfry windows, which have geometrical traceries enclosed within semicircular arches, affording, like the south transept porch, a curious illustration of the indifference of Italian architects to the use of the pointed arch where strength was not of consequence.

Italian campanili have quite a character of their own, so distinct from and utterly unlike the steeples of Northern Europe, that this, the first Gothic example I had seen, interested me exceedingly. Perhaps its detail was almost too little peculiar, if I may venture to say so; for certainly it has left no such impression of individuality on my

carriage, and were soon on the road towards Brescia.

Not far from this road and within about eight miles of Bergamo lies one of the most interesting of the many castles of which one so frequently sees remains in the north of Italy. This is the castle of Malpaga, which was inhabited by the famous Condottiere Bartolomeo Colleoni, of whom we have already heard at Bergamo, and of whom we shall see something again at Venice. It belongs now to a nobleman who lives in the Città of Bergamo, and leaves this old and stately pile to the keeping of his hinds, who tend his silkworms, gather his grapes, make his wines, look after his corn and cattle, and



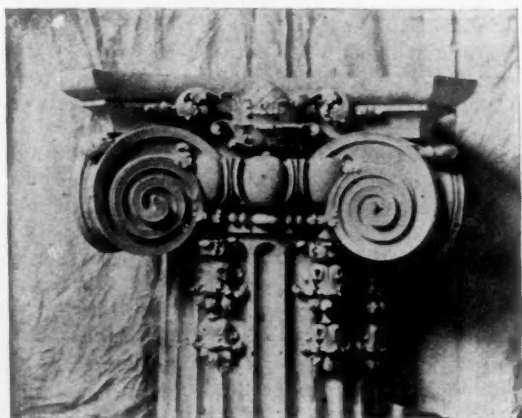
CAMPANILE, BERGAMO.

do as much as in them lies to gather the fruits which Mother Earth yields in these parts with such ungrudging profusion, but trouble themselves little about the preservation of the old castle or its belongings, seeing that they seem to give scant pleasure to their lord.

The castle as originally built was a square building enclosing a courtyard built of brick externally, and adorned with a forked battlement which is common everywhere in old buildings between this and Vicenza, and with four square corner towers, of which one larger than the others has a very bold and fine overhanging machicolated parapet. In the centre of the south front the drawbridge still remains in use, and was lowered for our exit from the castle. Outside the square castle was a space, and then a low wall again furnished with the forked battlement. This must have been a very picturesque arrangement; but unfortunately its real character is now only intelligible to the skilled eye. For the great Colleoni, finding himself in possession of a castle which gave him insufficient space for his magnificence, built up walls on the top of the old battlemented outer wall, and created his state rooms in the space between this new wall and the old external wall of the castle. These rooms of his have much damaged the effect of the outside of the castle; but internally they are still interesting, owing to the sumptuous character of the painted decorations with which he had them adorned. These were executed at about the time of the visit of Christian II. of Denmark to Colleoni, and are interesting if not great works of art. The old courtyard, though small, is very fine in its effect. The upper walls are carried on pointed arches and are covered with fresco or distemper paintings, said to have been executed by Giovanni Cariani of Bergamo, or by Girolamo Romanino of Brescia, extremely striking and attractive in their general style of color and drawing. The most picturesque incidents are illustrations of Colleoni's career, — the Doge of Venice giving Colleoni his baton in the presence of the Pope, and a fine battle subject.

A squalid area for rubbish, children, pigs, cats, and what not, is left all round the moat, and beyond this are all the farm buildings and laborers' residences, which go to make up the *tout ensemble* of a great Lombard farmyard. The surroundings are not clean nor very picturesque, but the castle itself has so great an interest that no one who visits Bergamo should pass it by unseen.*

(To be continued.)



TERRA-COTTA CAPITAL.
CARRÈRE & HASTINGS, ARCHITECTS.

THE accompanying detail from the Central Congregational Church at Providence was photographed before erection at the works of Stephens, Armstrong & Conkling, now the Philadelphia branch of the New York Architectural Terra-cotta Company. The terra-cotta all over this church is most charmingly executed. The brick was supplied by T. Milton Shafto & Co., of Philadelphia. Mr. F. J. Sawtelle, at Providence, superintended the work for Messrs. Carrère & Hastings.

* The round church of San Tommaso in Limine, described by Mr. Gally Knight as similar in plan to San Vitale, at Ravenna, is only eight miles to the north of Bergamo, and ought, equally with Malpaga Castle, to be seen. I regret that I have never yet visited it.

RECENT BRICKWORK IN AMERICAN CITIES PROVIDENCE.

UNTIL within three or four years the public and business buildings of Providence have been either of stone or of the traditional brick with stone trimmings. Nearly all the private houses were of wood. Fifteen years or so ago Messrs. Stone & Carpenter did introduce terra-cotta on a large scale in Slater Hall, at Brown University, in the Hotel Dorrance, and in some private houses; but the quality of the work did not quite suit them, so the attempt was never followed up. And although these gentlemen have always seized any opportunity to make ornamental use of brick, yet, with the exception of some single panels, it was not until they built the Burrill Building, at the corner of Westminster and Mathewson Streets, that they again took up the new material.



BURRILL BUILDING.

The Burrill Building, however, is not altogether of clay material. The first three of the five stories on Westminster Street are of light stone supported by the usual plate glass and iron; those above, and the whole Mathewson Street elevation, are of brick with terra-cotta trimmings. A glance at the photograph will explain the treatment. The top story has round-arched openings, the fourth, on Westminster

Street, has windows with square heads formed by terra-cotta lintels which are supported in the centre by cleanly modelled columns of the same material, standing free, while the jambs are ornamented with a pattern in brickwork. The same arrangement, without the jamb ornament, is used on Mathewson Street. The color of the brickwork is light buff, with wide joints, while the terra-cotta is a little darker. While the distinction between brick and stone on the front is perhaps a trifle marked, the building as a whole is the best on the street. It is simple, dignified, and finely detailed.



TRAYNE BUILDING.

Mr. Ely's Trayne Building, nearly opposite the Burrill, is a studied design in gray brick and lighter terra-cotta, with very fine detail, and the whole makes one wish that he had not used copper bays to fill his three main openings, which rise through two stories and are round headed. The first story of iron and glass, with a side entrance of stone, leading to the offices in the upper stories, is very well handled.

Perhaps the best use of copper bays in this neighborhood has been made in the Conant Building, in Pawtucket, which is a city almost continuous with Providence, by Messrs. Gould, Angell & Swift. This design is executed in old-gold brick, with brownstone trimmings and galvanized iron cornice. The bays, on the side, are of small projection and are enriched with delicate Renaissance arabesques.

As an example of Renaissance detail, the Telephone Building of Messrs. Stone, Carpenter & Willson, of which the elevation has already been published in *THE BRICKBUILDER*, is worth careful study. Above a first story of iron and stone, better handled than such stories usually are, rise two stories of brick and terra-cotta, divided vertically by fluted pilasters, and crowned with a terra-cotta cornice and balustrade. Over each of the store fronts which flank the main entrance to the Telephone Company's offices projects in the second story a bay window, which in this case is of terra-cotta, with engaged columns at the corners, and highly ornate frieze and cornice. Even here it seems

that the building would hardly lose in dignity if the bays were not used. The proportions of the buildings are right, and the detail is exquisite; do we really need the bays, finely handled as they are?

The outer walls of the Telephone Building carry the steel beams without the aid of columns, but the interior is all of skeleton construction; terra-cotta arches on steel beams are carried by steel columns, which, in their turn, are protected by terra-cotta. The roof is built in the same way and covered with concrete and asphalt.

The telephone wires in this city are carried underground in a sub-way accessible through manholes. When the cables reach the new building they pass under the sidewalk into a tunnel-like space partitioned off for them in the cellar, where they are carried on racks, projecting horizontally from each side wall until they reach the cable tower which communicates with the rest of the building only on the top floor at the distributing room. They are carried up the opposite sides of this tower, which is provided with ladders and with platforms every seven feet in height, on alternate sides, for convenient access to the cables. From the distributing room the wires are carried under the raised floor of the operating room to the switchboard.

The same architects have in hand the new Central Police Station for the city. This building is also in the Italian Renaissance, and, though not so ornate as the Telephone Building, has just as fine proportions and a very fine arrangement of masses. It is a good example of the truth, which our architects have been slow in learning, that however much good ornament may help a well-proportioned and well-massed building, such a building will lose none of its power or charm if it be left quite plain.

Though all of the terra-cotta work just spoken of has been done with Renaissance detail, as is indeed largely the case in other cities since the Classic style is once more in the ascendant, the material lends itself with equal ease to Gothic forms.

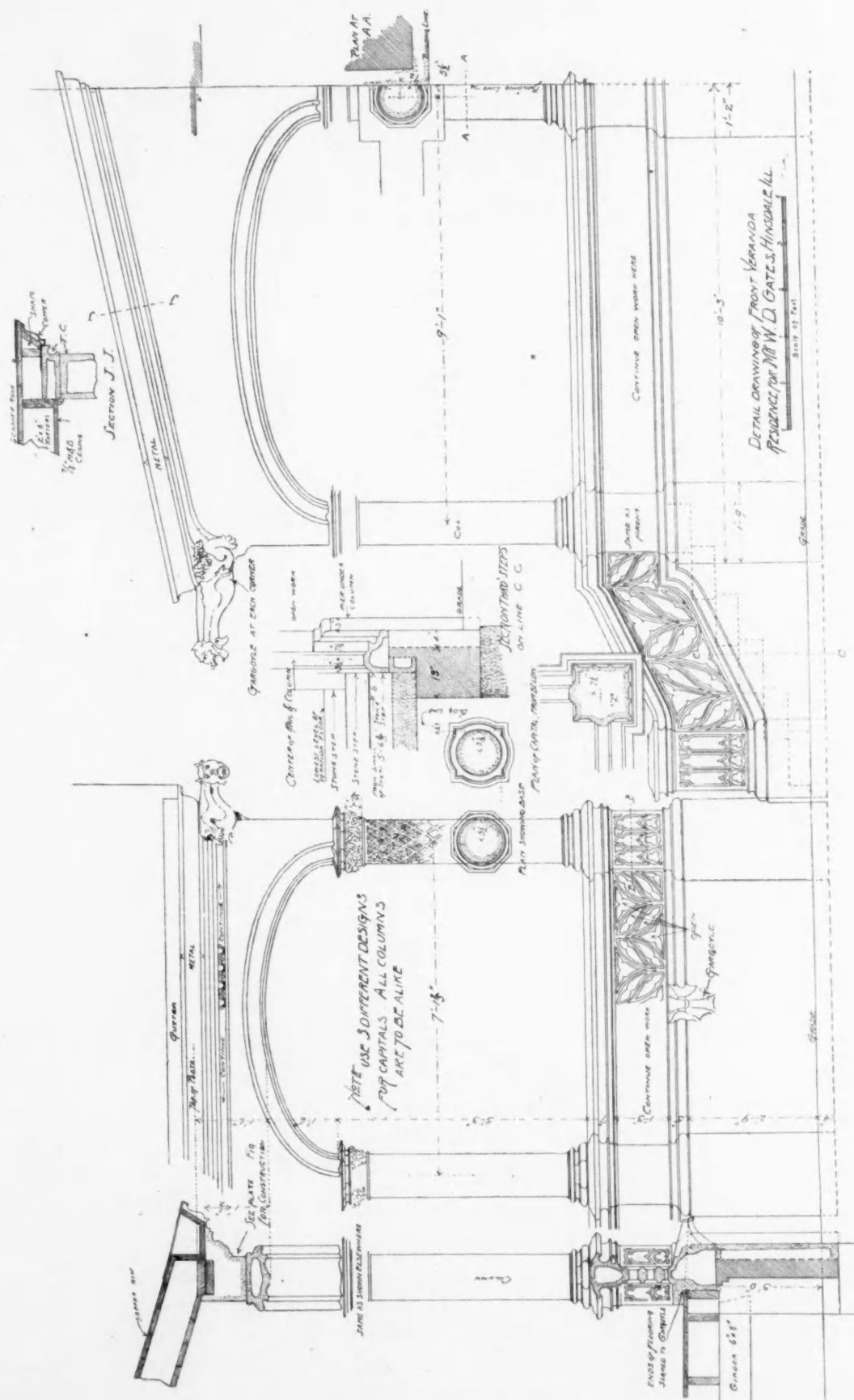
Another building now going forward for the city is the Museum of Art and Natural History at Roger Williams Park.* Here the architects, Messrs. Martin & Hall, have used yellow brick and terra-cotta together in a very pleasing way. The inspiration of the design, which is very refined and skilful, has been drawn from the French châteaux of the early Renaissance.

There is something very attractive in the outbreak again and again of the irrepressible Gothic spirit among the classic forms which were just coming into use in those old buildings. The style has all the picturesque quality which we enjoy in Gothic, while it is nearer our own time and taste in its forms; at the same time it is in its best work scholarly and refined without being so learned and precise as the Italian is apt to be, and withal it is perfectly adaptable to any needs which it may have to meet. All these points the architects have seized, and, while they have kept their work simple and dignified and have avoided all temptation to be picturesque and use angle turrets and other startling effects, they have allowed their fancy considerable play in the details.

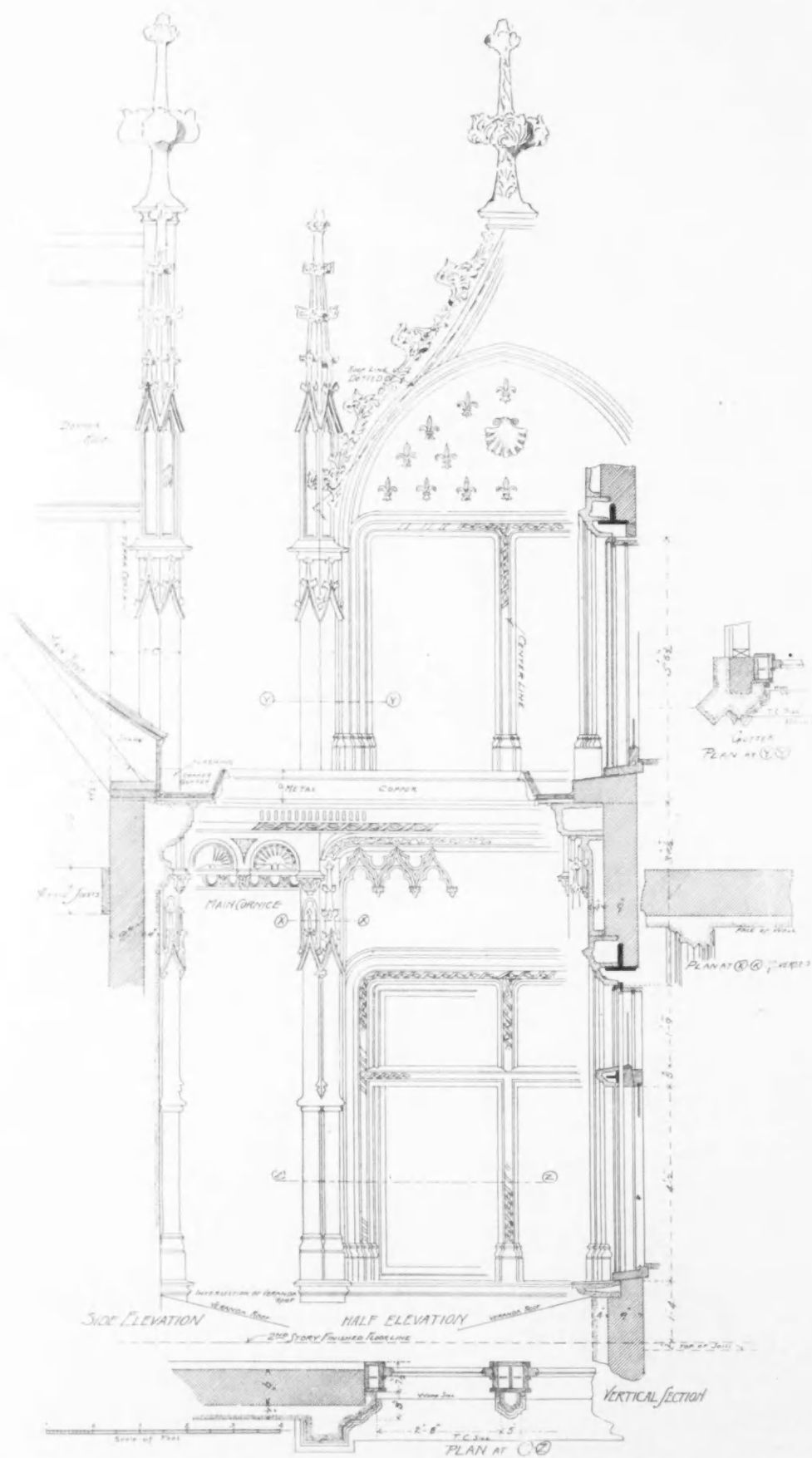
Thus far the city work is in competent hands. But a stop is soon to be put, it seems, to this sort of nonsense. There is a resolution now before a committee of the Common Council (it has been passed by the Aldermen, and I understand the Mayor favors it), which will turn over the official architecture of the city to the tender mercies of the city engineer's office! The scheme seems to be not to create the office and department of city architect, but to add to the force of the engineer's department a few architectural draughtsmen and an architectural superintendent.

Of course all interested in art foresaw the result. The Chapter of the Institute here took up the affair and tried to make a fight for reasonable methods of doing business. The tide is too strong and they have had to drop the matter. The Council think they are saving money, and they are blind to any other view. The engineer's department costs fifty-three thousand dollars a year. For four recent years, — years, too, in which there was more than the average amount of building, — the city paid about seven thousand a year for architects'.

* A scale detail of part of this building was published in the last number of *THE BRICKBUILDER*.
† The resolution has been tabled by Council, I am informed, and there the matter now stands.



DETAIL, RESIDENCE OF W. D. GATES, ESQ., HINSDALE, ILL.
MESSRS. JENNEY & MUNDE ARCHITECTS, CHICAGO.



DETAIL, RESIDENCE OF W. D. GATES, ESQ., HINSDALE, ILL.
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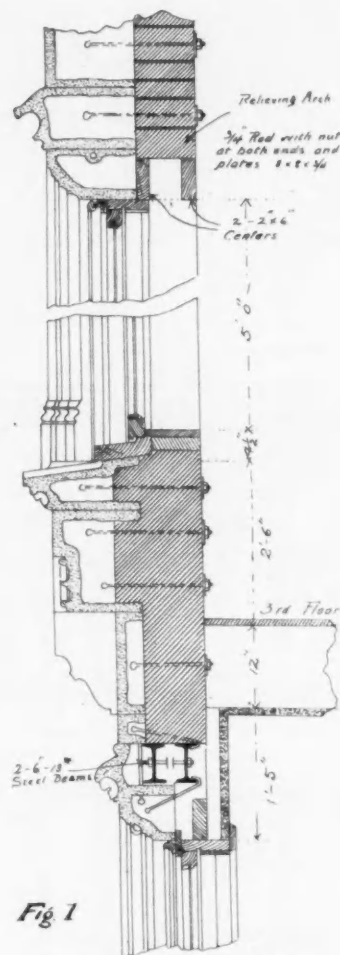


Fig. 1
SECTION AT DORMER IN TOWER
SHOWING CORBELLING

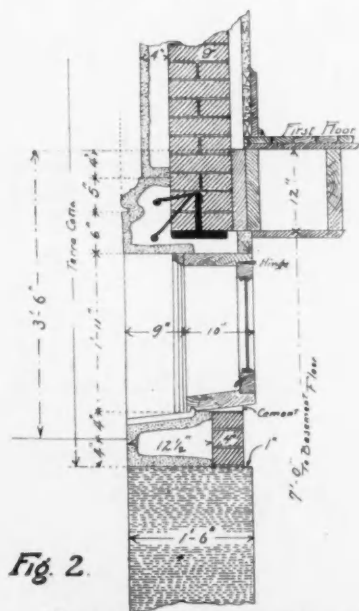


Fig. 2
SECTION OF BASEMENT WINDOWS

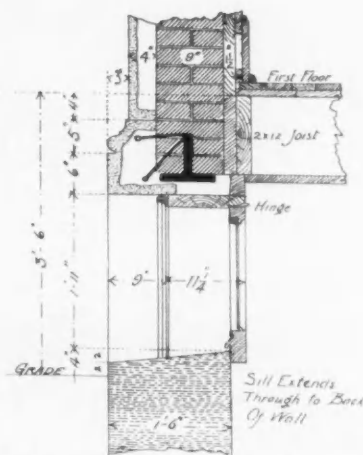


Fig. 3
SECTION OF COAL CHUTE WINDOWS

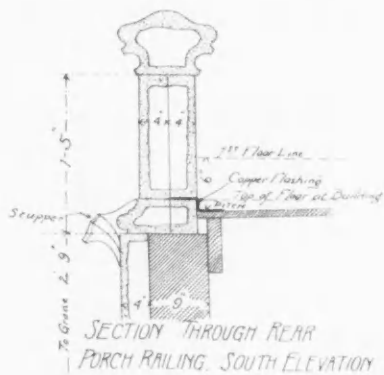


Fig. 4

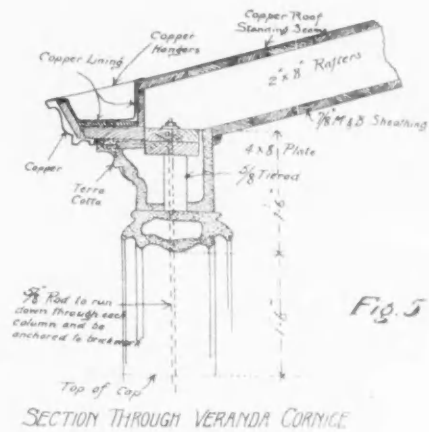


Fig. 5
SECTION THROUGH VERANDA CORNICE

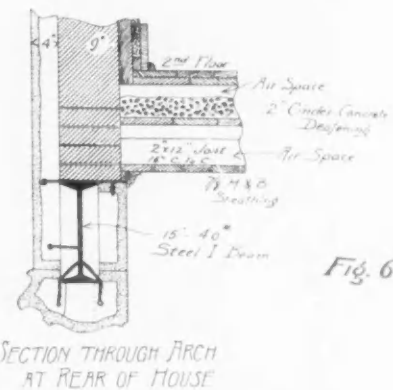


Fig. 6

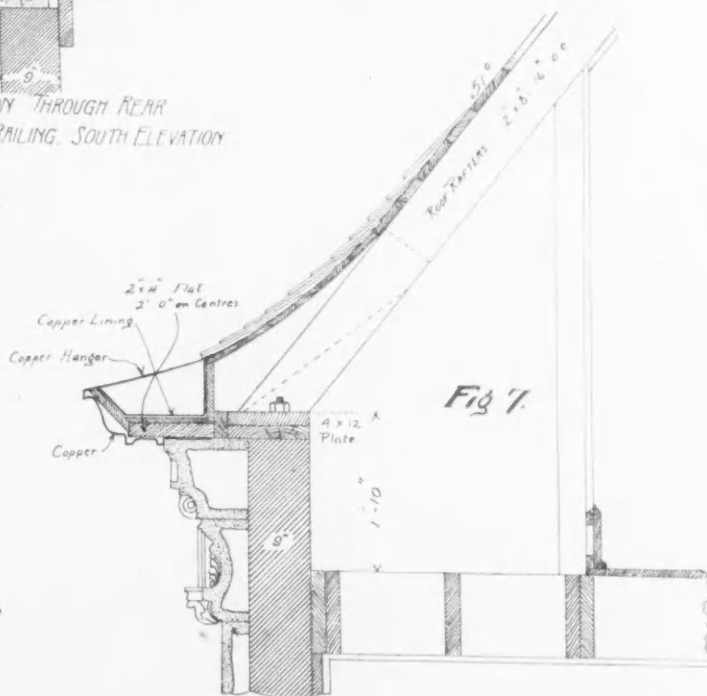


Fig. 7
SECTION OF MAIN CORNICE

DETAILS, RESIDENCE OF W. D. GATES, ESQ., HINSDALE, ILL.
MESSRS. JENNEY & MUNDIE, ARCHITECTS, CHICAGO.



SIDE ELEVATION, STORE AND OFFICE BUILDING

(ONE-EIGHTH-INCH)

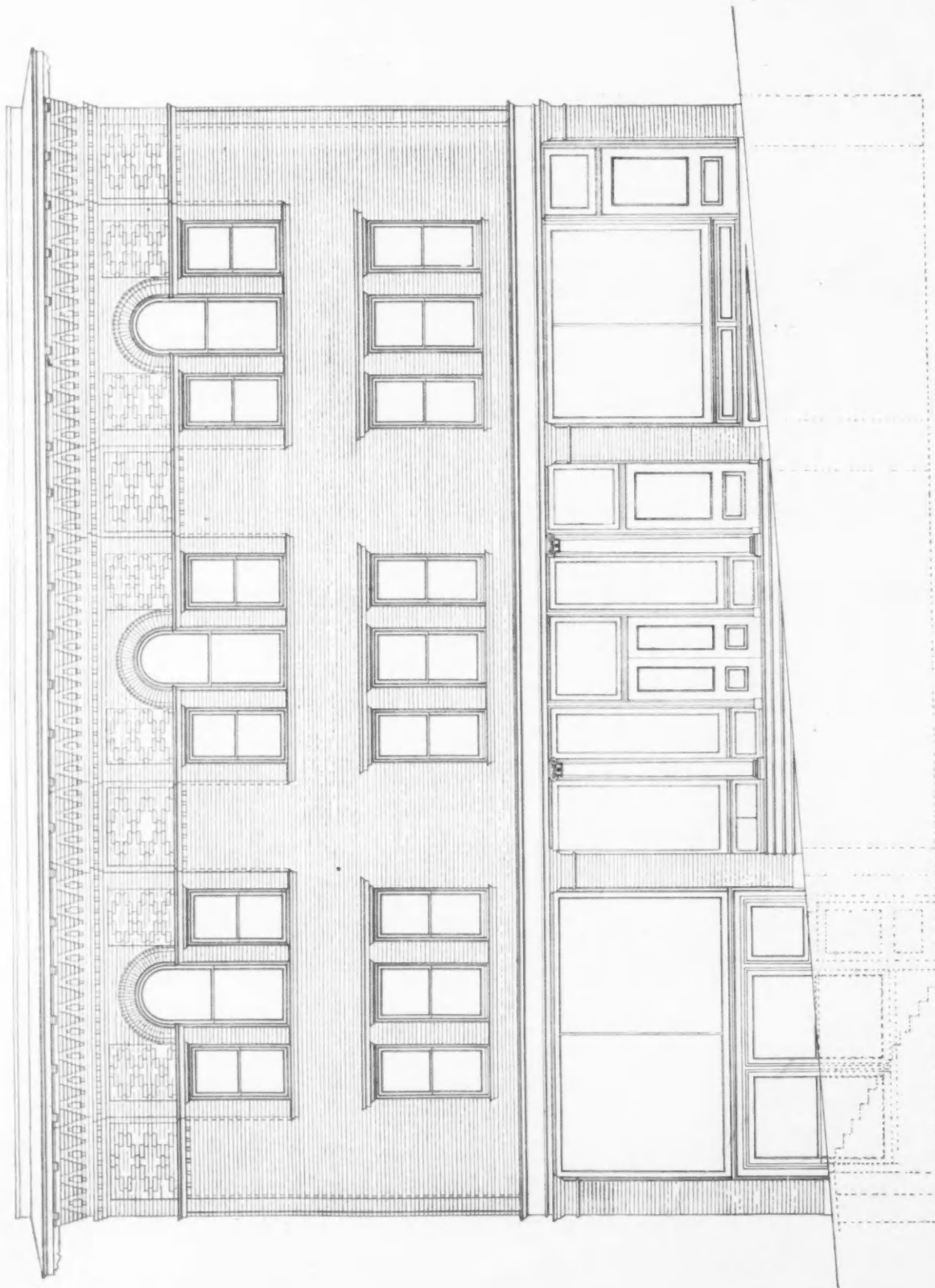
MESSRS. WALKER & KIMBALL, ARCHIT



BUILDING FOR D. C. PATTERSON, ESQ., OMAHA, NEB.

[ONE-EIGHTH-INCH SCALE.]

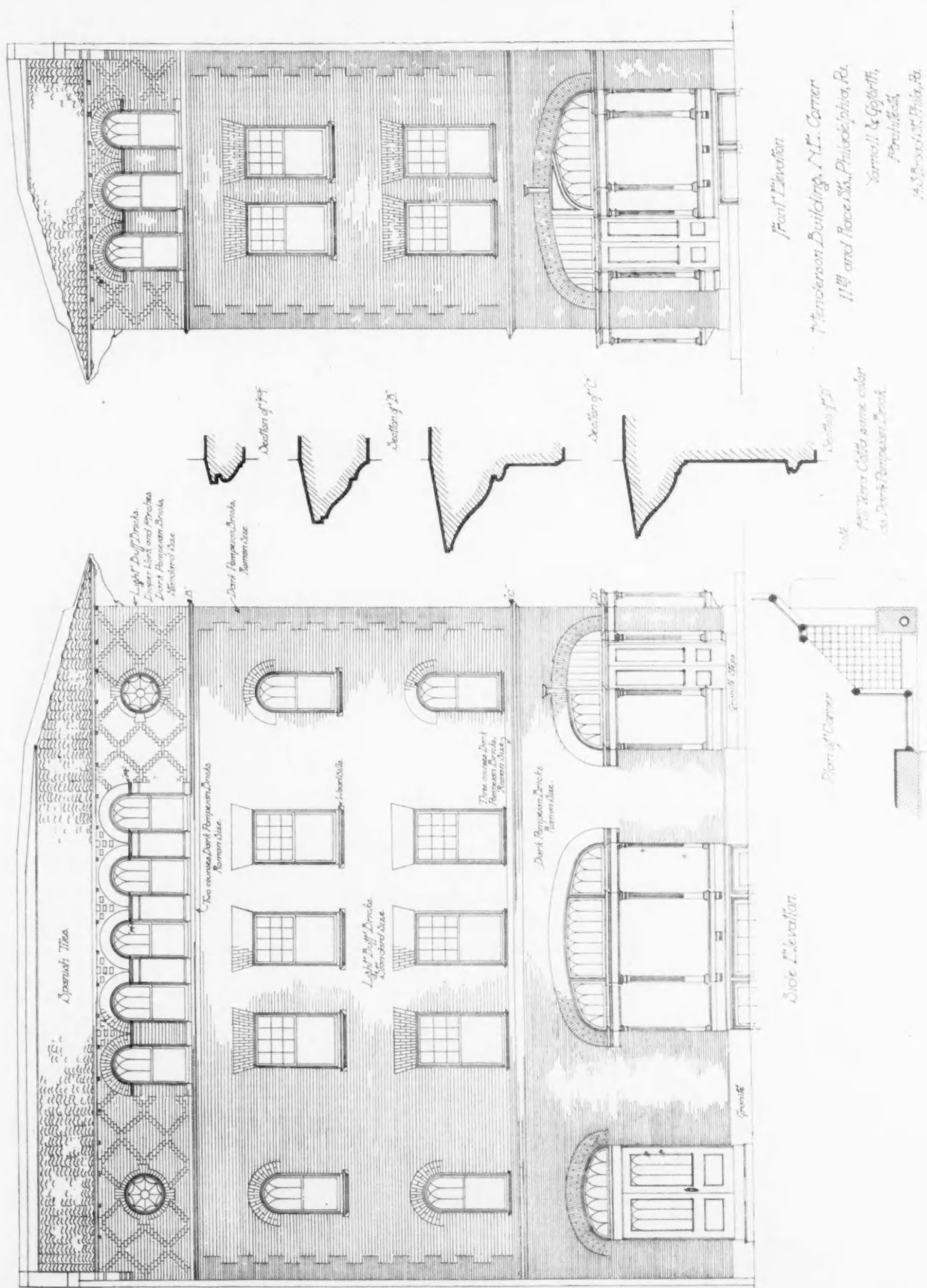
BALL, ARCHITECTS, BOSTON AND OMAHA.



FRONT ELEVATION, STORE AND OFFICE BUILDING FOR D. C. PATTERSON, ESQ., OMAHA, NEB.

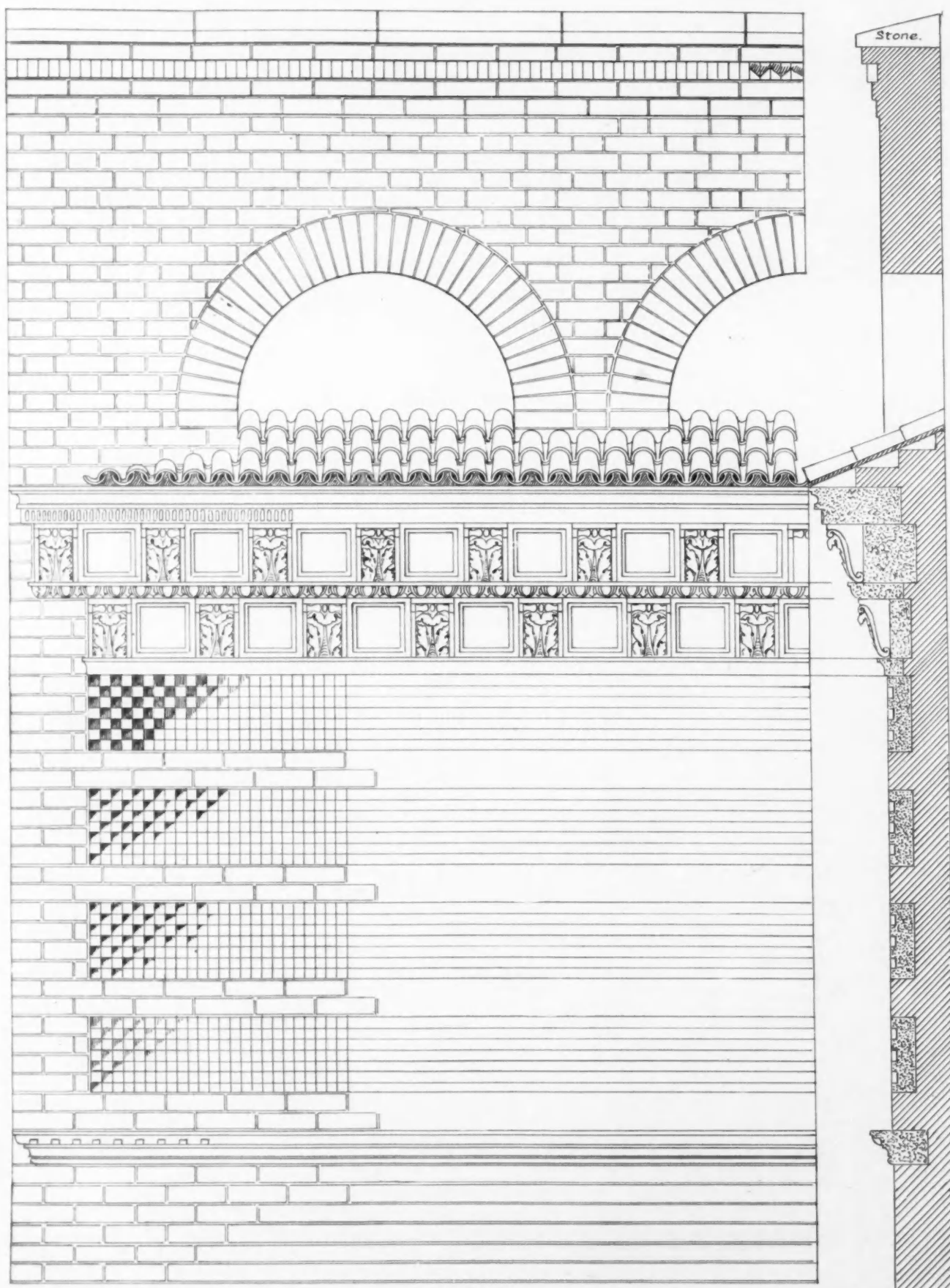
(ONE-EIGHTH-INCH SCALE.)

MESSRS. WALKER & KIMBALL, ARCHITECTS, BOSTON AND OMAHA.



Part Deviation

Henderson Building, N.W. Corner
 11th and Race Sts., Philadelphia, Pa.
 Cornell & Goffert,
 Printers
 143 Second St., Phila., Pa.



THREE-QUARTER-INCH SCALE DETAIL, CORNICE OF BERKELEY LYCEUM, NEW YORK.

ALFRED E. BARLOW, ARCHITECT, NEW YORK.

commissions. That this sum, which is only a trifle over the engineer's yearly salary, is extremely low when considered as the cost of a city architect's department, and that for this sum it is possible to obtain first-class work, while if architectural draughtsmen are added to the engineer's department, it must augment the cost and at the same time lower the character of the work, — all this seems not to enter their thoughts. We can save money — why can't the engineer take care of the work? Before such questions the extravagant architects retire abashed, for with such men those questions cannot be answered. It is the old story of the materialist against the idealist, of science against poetry, and, unfortunately, the judges are prejudiced and must be educated by experience.

the most aristocratic street in the town, yet the course of empire, moving eastward this time, had long since carried the greater part of its congregation into the newer and more fashionable part of the "East Side." The new church, therefore, stands on quite high ground in one of the pleasantest spots in the city, and in one where the best architectural effort of the last few years has had a chance to show itself, for around the church are houses by Messrs. Stone, Carpenter & Willson, Rotch & Tilden, Gould, Angell & Swift, and W. E. Chamberlain. Mr. Sawtelle, the architect who had charge for Carrère & Hastings of the erection of the church, has built the parsonage beside the chapel, and Martin & Hall are now filling the last vacancy in this Stimson Avenue colony.



CENTRAL CONGREGATIONAL CHURCH, PROVIDENCE, R. I.

MESSRS. CARRÈRE & HASTINGS, ARCHITECTS, NEW YORK.

St. John's Church, on North Main Street, to turn to a pleasanter subject, has within a year or so finished a parish house designed by Messrs. Peabody & Stearns. The material is yellow brick of different dark tones, and the treatment is very simple and quiet, and depending for its effect not upon ornament but upon mass, proportion, and the color harmony of the different bricks employed.

The old St. John's itself is of stone, but there are several brick churches in Providence. Some of them are exceedingly evil in design, one of them attains to no mean rank, and that one only, of which more in another article, can be compared with the new building which Messrs. Carrère & Hastings have recently built for the Central Congregational Church. The growth of the city has left several churches, still occupied, on streets which are now more or less crowded thoroughfares. Though this was not the case with the Central, whose old church, built about fifty years ago, was then upon

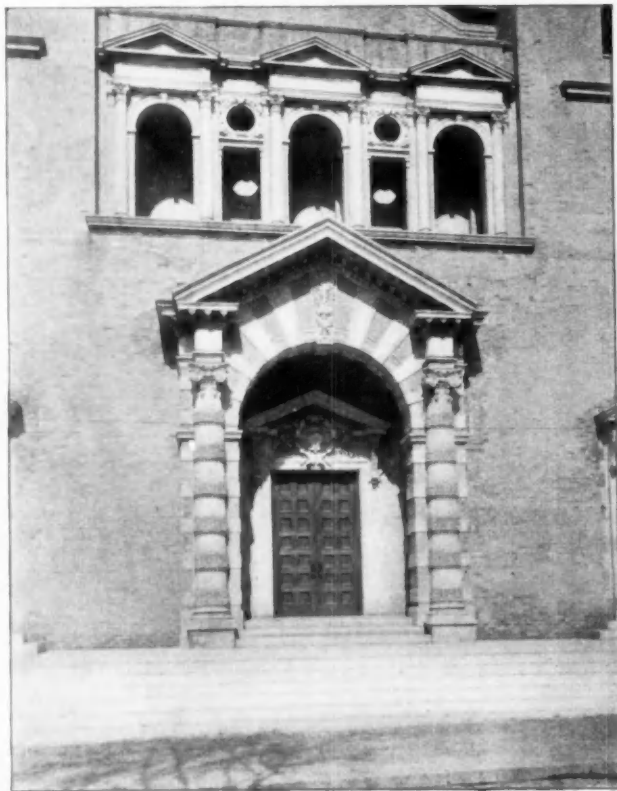
But these houses, save here and there the first story of one, are not of brick, and we must return to the church. The mass of it, as seen from a distance, and it is on high enough ground to be seen in some directions from far away, is very good, though possibly the dome is a little flat. All the near views of the church are good. The best of course is one of those which bring the tambour over the crossing into the centre of the picture. The view from the east end, really the north end, up over the chapel and the apse, is full as fine as from the front. The mass from these points is most excellent, though the tambour is a trifle bare and perhaps the cornice of the dome is a little too shelf-like for the splendid detail of some of the other parts of the church.

The view we have just taken emphasizes the cruciform plan of the church, with its chapel behind the semicircular apse. The west front, here really the south front, has the traditional two towers, the

three doors, and the central windows, though these here are blank, all beautifully handled, with some of the feeling of the old Spanish work of the Southern Americans, but with the clean-cut, classic detail of Italy. A short nave, with a barrel vault,—a real barrel vault of tiles,—forming the roof as well as the ceiling, a nave which has its regular side aisles, leads us to the crossing over which, sustained by the four heavy brick arches which form the square and by the pendentives drawing the square into an octagon, and then into a circle, rises the tile dome. Transepts extend with their side aisles east and west, and an unlighted, early-Christian-looking apse with its *concha* or hemispherical roof, forms the sanctuary on the north, here the ecclesiastical east.

The interior detail of the church is very fine and interesting. The organ-loft is somewhat unsatisfactory in execution, though the design is excellent. The angel figures with musical instruments, instead of being modelled in full round, or in relief against a background, are in low relief, with the background cut through, and the effect troubles one.

Aside from the organ loft, the pews, the pulpit, and the sanctuary furnishings, which are of wood and very finely detailed, the interior detail is of terra-cotta and of plaster. The tiling of the dome and of the vaulting shows inside, except in the apse. The brickwork is

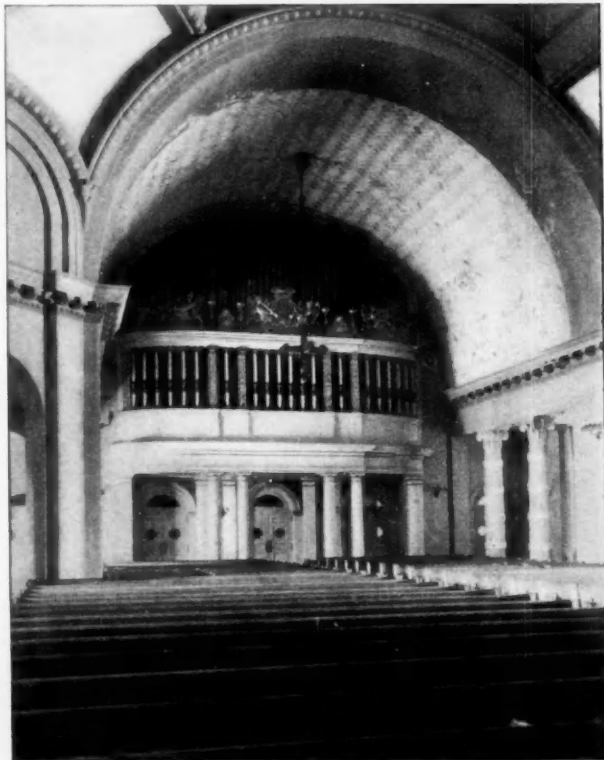


CENTRAL CONGREGATIONAL CHURCH. FRONT ENTRANCE.

plastered. It is of course intended to decorate the whole church in color after the manner of the beginning made in the apse dome, and if Mr. Schladermundt has the chance to finish the work as he has begun, the church will be an example of what color decoration ought to be as a support to architecture.

The color scheme of the outside of the church, too, has been well handled. Buff bricks, which here have a pinkish tinge, and there have turned a beautiful green under the weather; light terra-cotta, beautifully modelled; tile roofs of a dull, purplish red, with terra-cotta lantern again over the dome, and gilt crosses on the towers, on which the terra-cotta at the roof angles contrasts well with the tiling, form a very pleasing combination.

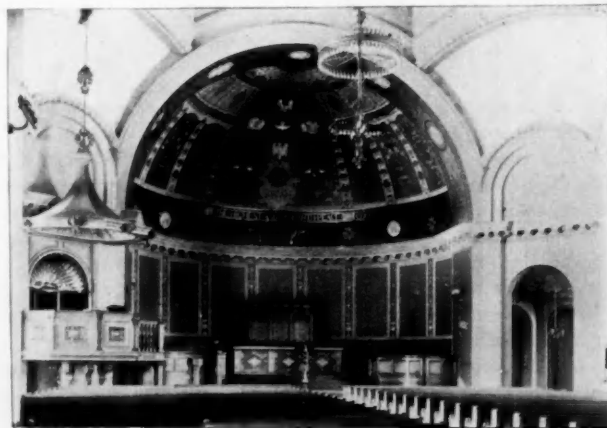
The crosses on the towers and the cruciform plan of the church show the progress toward ritualism which the "Lord Brethren," as Blackstone called them, are making in the wake of the "Lord Bishops." In fact, considerable has been the comment on the action of a sober Congregational society in building its "meeting-house" in a style which reminds the laity, at least, of cassocks and berettas.



CENTRAL CONGREGATIONAL CHURCH. ORGAN LOFT.

To the architect, of course, the question simply reads, Does the building meet the requirements of the problem and does it meet them beautifully? Whether Renaissance or Gothic is the more to be preferred for churches, is a mere matter of personal taste. This church seems to meet its problem beautifully. There is, then, no need to talk, after all, of denominational fitness or unfitness as absolutely fixed, for this or that style. Let the architect go straight through the problem with his best ability according to the best taste he has, using such forms as seem to him pleasing, and, if he is an architect, he need not be afraid of the verdict.

NORMAN M. ISHAM.



CENTRAL CONGREGATIONAL CHURCH. PULPIT.

WASHINGTON.

SUCH a variety of styles, if I may call them such, are to be found in Washington that the cultured visitor is really bewildered as he walks up and down its streets. On every hand one finds hideous examples of what the average citizen points to with pride and calls "modern architecture."

Here and there the eye is relieved by the sight of a quiet front, so modest and retiring that it seems to shrink from the loud clothes and gaudy finery of its ostentatious neighbors. It is scarcely noticed by the novice, and if at all, the remark is heard: "Anybody can design a thing like that."

These quiet fronts are, for the most part, relics of the taste of the past, and show great skill and refinement in the relative proportions of openings to wall surfaces. Built of hand-made pressed brick of delightful color, crowned with good cornices, usually of moulded brick painted white, of a pattern not now in stock, with doorways generally of Colonial treatment, they stand as landmarks of the artistic appreciation of two generations ago. One who has not seen them cannot imagine the charming effect produced by these cornices of brick. The projection is not great,—about four and a half inches. The soffit is ornamented with mutules, and the returns at the corners with the conventional honeysuckle, as is so often seen in the Greek Doric.

Apparently the architects of Washington have but recently thoroughly appreciated the artistic possibilities of terra-cotta in combination with brick, and many still are learning. Preferring stone for the solution of their problems of decoration and construction, the examples of really good treatment of brick fronts are the exception, not the rule. Here, as in other Eastern cities, public taste is improving sufficiently to be able to distinguish the superiority of the present work over that done ten years ago, and to wish for more. This is a good sign, and we may well feel glad that it is so.

Of private residences done in brick, those of John Hay, Esq., and General Anderson, designed by H. H. Richardson, are probably familiar. They are very quiet, moulded brick being confined to the base courses and cornices. The wall surfaces are given life and color by pattern-work, and often hexagonal shaped brick are used, which, from their peculiar shape and color, make the design more pronounced. Many houses by Hornblower & Marshall have well-studied brick friezes, surmounted usually by copper cornices, lending character to otherwise plain but well-proportioned fronts. The house of Representative Dalzell, on New Hampshire Avenue, has the wall surfaces of the façade slightly enriched by pattern-work of darker headers. The entrance is unique in its way. It is a semicircular opening within a square frame, framed by a running conventional design carved in lighter brick, making the whole quite Moorish in feeling.

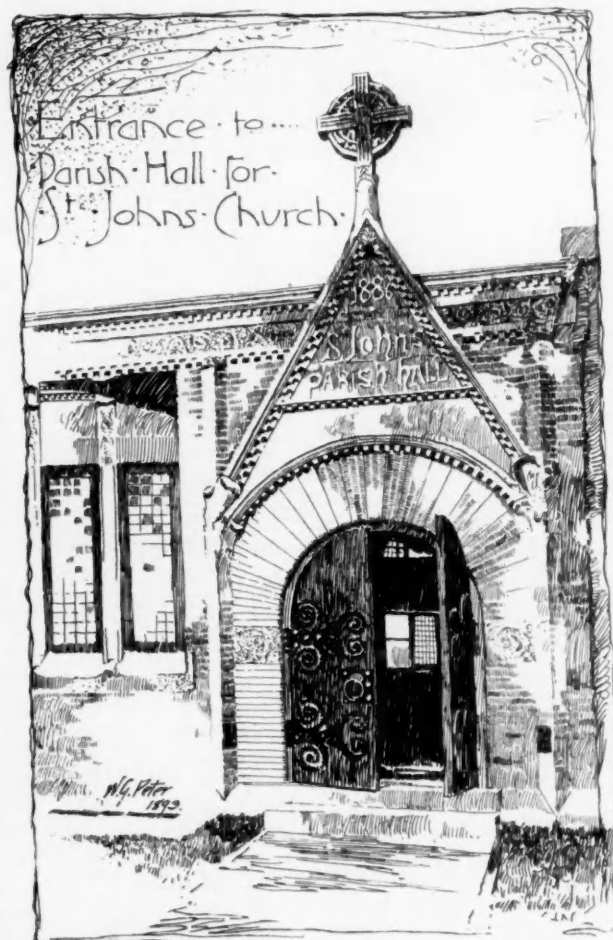
A very nice bit of brick and terra-cotta work is that of the Parish Hall of St. John's Church, on Sixteenth Street. It is to be regretted

that it is so small, as a larger building worked out in a similar manner could not fail to be an ornament to the city. The Army and Navy Clubhouse shows what refinement can be gotten by the use of perfectly plain, rough red brick with red mortar joints. Perhaps the most striking example of a structure wholly of brick and terra-cotta is the United States Pension Office. This building has been the cause of as much comment, both of praise and condemnation, as any building ever erected in the District of Columbia. Its popular name is the "Beer Brewery." One well-known gentleman of high standing has been known to remark of it, "The only fault with it is, it is fire-proof." All this adverse criticism arises from its having a hideous, barn-like structure towering above the main roof, entirely out of keeping with the building proper, and forming the roof of the large court. Moulded on the lines of the Palazzo Farnesi at Rome, the principal façade is considerably longer. By thus altering the proportions, a

good deal of the character of the original is lost. But, standing at a point where the ugly cupola cannot be seen, the building is very imposing and quite pleasing. The details are entirely of terra-cotta, and well executed.

In the new power-house of the Washington and Georgetown Railroad Company, by Burnham & Root, the design fully expresses the character of the building. It is of dark-red brick with black mortar joints, and has just enough stone to relieve the monotony. Terra-cotta might have been substituted for the stone without artistic loss. Many residences recently erected are of various shades of buff and mottled brick. One in particular, on the corner of Massachusetts Avenue and Twenty-first Street, is worthy of notice, as in it the attempt has been made to grade the color from chimney top to ground level from dark to light, with considerable success.

It is to be regretted that, with so many colors from which to choose, more harmony among buildings in the same block cannot be gotten. Perhaps an improvement might be made if there were



(SEE ARTICLE ON THIS PAGE.)

more concerted action on the part of the architects. While slight differences of color do not cause any one to deter from the harmony of the whole as viewed from a distance, when we see jumbled together red, white, yellow, brown, with perhaps here and there a green one, the effect is anything but pleasing. The very fact that they have such variety





STORE AND OFFICE BUILDING FOR D. C. PATTERSON, Esq., OMAHA, NEB.
MESSRS. WALKER & KIMBALL, ARCHITECTS, BOSTON AND OMAHA.

of color to choose from is their undoing. It is a case of embarrassment of riches, which the able man may know well how to handle with the taste insuring the best results, but which the average unartistic builder-architect considers his opportunity to concoct something original.

Many buildings have details in brick and terra-cotta so good as to save the whole from utter failure as works of art. Chimneys, doorways, cornices, gables, can be picked out all over the city as being better than the buildings they adorn. The cornice of the new addition to the Washington Gas Light Company's offices, a sketch of which is here shown, is a good sample.

E. W. DONN, JR.

PLATES.

Plates 25, 26, and 27 are illustrative of the first article published in this number.

Plates 28, 29, and 30 give the two elevations of the building shown by the prospective sketch on this page. The plain walls are laid with sand-struck common hand-made brick (light burned). The trims are of red front brick (Omaha Hydraulic-Press) somewhat darker than the others. Joints white for body, red for trims, and tuck-pointed.

Plate 31. Henderson Building, Philadelphia, Yamall & Goforth, architects. The brick were furnished by the Eastern Hydraulic-Press Brick Company and the terra-cotta by Stephens, Armstrong & Conkling before their consolidation with the New York Architectural Terra-Cotta Company. The plate is one-eighth-inch scale.



Plate 32. Cornice of the Berkeley Lyceum, New York, Alfred E. Barlow, architect. Terra-cotta work by the New York Architectural Terra-Cotta Company. This is a good example of a brick and terra-cotta cornice with practically no projection, gaining in height what it loses in projection.

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

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PUBLISHERS' STATEMENT.

No person, firm, or corporation, interested directly or indirectly in the production or sale of building materials of any sort, has any connections, editorial or proprietary, with this publication.

A PROMINENT manufacturer of terra-cotta criticises the editorial in our last number, on brick and terra-cotta coloring, as apt to give architects a wrong view of the subject. He himself takes exactly the opposite view from that of our editorial, and supports it with these arguments.

A brick manufacturer will sort a kiln of bricks of one color, into ten or twelve different shades, and of each shade he will have enough stock to supply an ordinary job. Now, while the application of color by a "slip" is simple enough, burning it to exactly a certain shade is not so easy. If, for instance, an architect wishes uniformity in brick and terra-cotta, and selects one of the several shades of a certain colored brick, the terra-cotta manufacturer may have considerable difficulty in exactly matching it, although he would strike so near it as to match a shade two or three degrees above or below the one selected. The architect, then, it is suggested, should give the terra-cotta manufacturer the first place, allowing him to make a color to match a certain color, not a certain shade of brick, though keeping his terra-cotta of a uniform tone. The terra-cotta will certainly match one of the several shades into which that color of brick is sorted, and that shade can be taken for the work.

OUR article in the last number was written from the recent experiences of several architects who had tried to have a brick made to match terra-cotta, and possibly the inspection of a very well-equipped terra-cotta plant was so fresh in our minds that we over-estimated the ability of terra-cotta manufacturers to produce exact matches. However, having stated the criticism as nearly as we remember it, let us suggest that this criticism might not apply to the cases we had in mind. Brick manufacturers are not found in every market, carrying stocks of a large number of different colors. Suppose the brick the architect wanted was not to be had in his locality, in stock. It could be made, and come pretty close to the required shade. The question is, Can the average well-equipped brickyard make a special run of brick and closely match a certain shade, easier than one of the scientifically operated terra-cotta factories commanding every facility for securing special color-work? We still

hold to our position, with a concession in the case of the several large cities where every variety and shade of brick is found in stock, and there is no need of having a color made to order. As, however, we base our opinions upon the experiences of a comparatively few architects, we invite correspondence for publication, from both manufacturer and architect. If there is any question as to which is the better and fairer method, THE BRICKBUILDER columns are the place for its discussion.

MR. GLENN BROWN of Washington, in his article "Government Buildings compared with Private Buildings," in the *American Architect* of April 7, gives some interesting tables showing cost and time of construction, and completion of first, second, and third class structures, from which the following averages of cost are instructive. Eight first-class structures, that is, structures that are fireproof throughout, cost an average per cubic foot of $37\frac{1}{4}$ cents. Six buildings of the second class, erected of less costly materials, but with iron beams and terra-cotta or brick arches for the floors, averaged $24\frac{1}{2}$ cents per cubic foot. Only two buildings of private nature are included in the third class, which is plain brickwork, and wooden joists and flooring. These cost 10 and $12\frac{1}{2}$ cents per cubic foot. Much of the cost of the buildings of the first class comes from the highly ornamental character, or the use of expensive cut stone work, and, judging from these buildings, it is safe to estimate that a good brick fireproof office or mercantile building can be built for not over 25 cents per cubic foot.

THE government, however, from these tables, appears to be paying 30 cents per cubic foot for a $12\frac{1}{2}$ -cent building. It is getting nothing but wooden floors, while buildings privately built are made fireproof for five cents less per cubic foot. In first-class buildings it pays 60 cents against plain, ordinary people's 37 cents. It now looks as though Mr. Burnham's blunt letter to Mr. Carlisle had caused that gentleman, who is supposed to guard the money interests of the country, to continue not only paying twice what ordinary people pay, but getting atrociously bad returns for his liberal investment.

MR. CARLISLE made a mistake in considering Mr. Burnham and his associates on the committee of the A. I. A. some of those "architect fellows" who could be indefinitely put off. As a matter of fact, any one of that committee is probably a man of broader calibre than the honorable secretary of the treasury, and Mr. Burnham's professional career certainly proves him fully as strong a man as Mr. Carlisle. But the latter is in his castle and surrounded by political henchmen of all grades, whose general methods no member of the committee of architects could come down to. Mr. Burnham's letter has been criticised quite as freely as it has been commended. But what other course was open to him? It was quite evident nothing would be gained by submitting quietly, while, by putting the thing in plain, unvarnished fact, he did the one thing that no milder course would have accomplished: he drew the attention of the public by making an issue the newspapers would take up.

PROF. A. D. F. HAMLIN, of the Department of Architecture, Columbia College, New York, makes the interesting announcement that he will conduct a summer travelling school of architecture, limited to fifteen members, taking them to Italy early in June and returning early in October. The programme

is made out especially with reference to a study of the Italian Renaissance style, and, starting from Naples, the trip will include Pompeii, Herculaneum, Capri, Rome, Spoleto, Foligno, Perugia, Arezzo, Florence, Siena, Pisa, Lucca, Pistoja, Bologna, Ferrara Padua, Venice, Vicenza, Verona, Mantua, Milan, Pavia, and Genoa. Thus, it will be seen, most of the places in Italy of any architectural interest will be visited, and such a trip with a man of Prof. Hamlin's scholarly attainments cannot fail to result beneficially to the students who go. It is with great pleasure that we call the attention of our readers to this project. Full particulars may be had by addressing Prof. Hamlin at Columbia College.

"THE BRICKBUILDER" COMPETITION FOR A CITY HOUSE.

PROGRAMME.

IT is supposed that a client has a forty-foot lot in New York City, upon which he wishes to build a fine residence, which, if he desires to sell at some future time, he may convert into two separate houses, so that they will not only sell the easier, but so sold, bring a higher price than the one large house would bring. To this end the house must be planned so that it may be convenient to use as a single house, but so that very little and inexpensive alteration would change it to two twenty-foot houses divided by a party wall. The exterior is to be of brick and terracotta, or wholly of terra-cotta. The cost is not limited. In planning, ten feet at the rear of the lot, which is one hundred feet deep, must be left unoccupied.

The problem is principally one of both planning and design, for to be successful it must have the appearance of a single house, and yet when divided appear equally good in design as two separate houses.

The house will consist of four stories besides a basement and cellar. An elevation at one-quarter-inch scale, and a plan of each floor at one-eighth-inch scale, are the drawings required. A description of the alterations necessary to convert the house must be prepared and reasons given for the plans and the elevation adopted. The drawings are preferred flat, but when it is inconvenient to so send them they may be sent in pasteboard rolls. They are to be made on white paper, imperial size, the elevation on one sheet, the plans on another, and sent, carriage paid, to the office of THE BRICKBUILDER, Room 52, 85 Water Street, Boston, Mass., on or before June 1, 1894.

PRIZES.

There will be three cash prizes; the first \$100, the second \$50, and the third \$25. Three other prizes in books will be given; the first any architectural book listed at \$15, the second listed at \$10, and the third listed at \$5.00. If there be more than six designs considered by the jury as meritorious, the authors of those not receiving prizes will be presented with a year's subscription to THE BRICKBUILDER.

The award will be made by a jury of three competent architects.

Each drawing must be marked with a motto or cypher, and a sealed envelope similarly marked, containing the full name and address of the designer, must accompany the drawings. These envelopes will not be opened until after the award is made.

The six prize drawings shall become the property of THE BRICKBUILDER, and any or all of the designs submitted will be published without further recompense to their authors.

For a club of fifteen subscribers the yearly price of THE BRICKBUILDER is only \$1.50.

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THE ROOF IN FIREPROOF CONSTRUCTION.

IT is certainly gratifying to see how much interest is now felt by architects, engineers, builders, and owners in fireproof construction. The desire for something durable, that will resist the great destroying elements of time and fire, is growing, and it is now generally conceded that the most durable and reliable materials for all kinds of buildings is burned clay, and therefore in all buildings where protection of life and property is desired it is being used more than ever in this country.

Insurance statistics tell us that the loss by fire is regularly and steadily increasing at the rate of \$10,000,000 a year. In the year 1893 the loss was over \$160,000,000, which is over \$512,000 for every working day. This does not include the loss by men thrown out of business or employment, nor the additional rates on insurance in consequence of the risk. Neither does it include the taxes necessary to keep up the fire departments in every city and town in the country to guard against the loss.

Nearly all the writers on fireproof construction refer to protecting the inside of buildings. The ceilings, floors, and between the joists are filled in with hollow clay blocks; hollow brick walls take the place of lath and plaster for partitions; iron supports and columns are encased with burned clay to keep the heat from twisting, cracking, and even melting them. In every conceivable way, clay bricks and blocks are used to prevent the fire from spreading and extending. All this is done for the inside of buildings, and it is well enough. It costs money, but it does the work. While this is done for the inside of the building, a roof is put on that offers no resistance to fire, but in many cases attracts it. The roof is the most exposed part of the building, and, next to the foundation, the most important. 29.6 per cent of the fires in 1893, and in fact an average for many years, was caused by exposure. That means that \$48,000,000 of property was destroyed by fire in the year 1893 that did not originate on the premises. To guard against loss from exposure the best protection is to fireproof the outside of buildings—to put on a roof that will resist the heat. The same material that will protect the inside will protect the outside. It is fast coming to that. All will concede that the fire-clay roofing tile is the coming roof in this country, as it now is in many European countries. There are many reasons for this, but your space will only allow me to present a few of the advantages tile has over any other material for covering houses.

First. Tile is fireproof, frostproof, and waterproof. To test the fire qualities, put a well-burned tile, and a piece of the best roofing slate, on your grate. See how quick the slate will crack and fly to pieces, while the heat of no grate can crack or melt the tile. Iron of any kind left in a kiln where tile is burned will be found melted when the kiln is opened. To test its frost qualities, put a tile under the drippings of your roof, and let it freeze and thaw the whole winter. You will see the frost will have no effect on it whatever.

Second. Tile is ornamental and durable. If there is a tile roof in your city, compare it with the roofs on surrounding houses, and see how much it adds to the beauty and character of the house. The roof is the most prominent part of a handsome building, and a tile roof always attracts attention to it. There is nothing shoddy about a tile roof; it is there to stay, and it will be just as good, and look just as well, one hundred years from now as it does to-day. Tile has a history of thousands of years; no other roofing material has.

Third. Tile is a non-conductor. Place a thermometer in an attic covered with tile, and another in an attic covered with slate, and see the difference. The rooms under a tile roof are cooler in summer and warmer in winter. It neither attracts nor retains the heat or frost. You never heard of a tile roof being struck by lightning.

Fourth. Weight. The old forms of tile are heavy and cumbersome. They were made by hand, in plaster moulds, and nearly always had to be plastered together with clay or cement. The new tile is made by machinery, under heavy pressure, and is compact and light. It weighs six and one half pounds to the square foot, while slate and gravel weigh ten pounds. This difference in weight is a very important point in constructing the walls and rafters of a building.

The new machine-made tile requires no paint; it is a beautiful terra-cotta red, the most appropriate color for the roof of a handsome house. It requires no cement that cracks and breaks, and by its construction it laps and locks together so no wind can move it, and at the same time accommodates itself to the vibrations and settling of the building. In case a tile is broken a new one can be inserted without removing adjoining tiles, and its lock holds it in place.

Price is an important factor in building. The old tile, made by hand, and the Spanish tile, laid in cement, are both expensive. The new tile, made by machinery, competes very closely in cost with slate. An ordinary dwelling of ten or twelve rooms seldom requires more than forty squares to cover it. If you can get a tile roof on a house of this size for an additional cost of less than \$100, it certainly should not be considered.

It is safe to say that in no branch of industry (except possibly electricity) has there been as much improvement in the last few years as in clay-working machinery, and it is to this improvement we are indebted for the interest now taken in fireproof construction. Ten years ago the ornamental brick, the hollow blocks, and other forms now used for fireproofing were unknown, or if known were impracticable on account of the skilled hand labor required to form them. Now the machinery made for clay men do the work better, and cheaper, and bring the best formed materials within reach of the builder. The architects and machine men have worked together in this improvement, the one suggesting and planning, the other putting the suggestions and plans into practical working machinery. The result is a greater variety of more compact materials, at a much cheaper cost. While this is true of brick, and fireproofing hollow ware, it is also true of roofing tile. The machine of to-day takes the place of the plaster mould, the steam dryer of the uncertain sun and wind, the closed kiln of the open top arrangement; and the result in tile is you have a compact, smooth surface, uniform in size and color, straight and true, so they fit well together and do away with plaster and cement, lighter in weight, and so reduced in cost that they are brought in close competition with the next best roofing material known. Machinery has done all this, and has enabled our best architects to predict, with absolute certainty, that tile is the coming roofing material for this country.

Another advantage machinery has given to the tile business is that they can be made so fast, and with so little loss, that a certain supply can be had without delay. Architects know the great difficulty and delay in the past in getting tile for their buildings. There were so few tile factories in the country, and they were always filled with

orders months ahead. The Clay Shingle Company of Indianapolis now have four large factories in different parts of the country making their form of tile, and are negotiating with others, so they are able to supply any amount of tile on short notice. Before this century closes every State in the Union will have its tile factory, and all first-class buildings will have fireproof construction on their roof as well as on the inside.

JOHN R. ELDER.

Indianapolis, Ind.

THE most dangerous part of a theatre, in point of fire risk, is the stage. Here clay materials, so far, have found practically no application, nor will they ever, in all probability. To say that canvas and wood can be treated with a simple paint or liquid finish so that they will not burn, seems to most people paradoxical; yet there are at least two, and possibly more, concerns manufacturing such preparations. At the works of the Martin Process Fireproof Paint Company, in New York, we were shown by Mr. George A. Nelson several tests of canvas, mosquito netting, wood, and straw, which had been treated with their paint and other protective preparations. By subjecting the materials to continued flame, they were slowly charred, but not once did any flames start. The principal theatres in New York have scenery protected by the Martin preparations, but in Boston we question whether a single manager has taken this precaution. We understand that the New York Fireproof Paint Company, on Maiden Lane, also manufactures successful preparations. Why could not such woodwork as is absolutely necessary in fireproof buildings be so treated? The preparation may be applied as a filler, to doors, floors, window frames, etc., before they are finally finished.

WE are informed that Minneapolis is to have a plant for the manufacture of hollow brick, etc., for fireproofing. The McMullan Brick Company has been incorporated there with a capital of fifteen thousand dollars. Joseph Congdon, a prominent contractor and builder, is the president, and James McMullan secretary and treasurer. The company will develop the plant of the Minneapolis Hydraulic Pressed Brick Company.

THE Central Congregational Church at Providence, illustrated on pages 61 and 62 of this issue, is interesting in showing an application of the Guastavino method of fireproof construction to dome and vault construction.

CASS GILBERT, Endicott Building, St. Paul, will advertise this month for bids on the Armoury Building, at Shattock School, Faribault, to be a fireproof building, with five-inch segment arches, partitions, and furring of hollow tile. Red pressed brick for outside walls. Estimated cost, seventy-five thousand dollars.

THERE will be erected in Philadelphia, on the corner of 15th and Market Streets, by Mr. Alfred Harrison, a twelve-story hotel, which is to be strictly fireproof throughout. The building will be entirely of terra-cotta, there being no bricks used at all, except possibly for the fire-escape tower. It will be a steel-frame building, every



THE SCARBORO, NEW YORK.

FIREPROOFING MATERIALS: THE LORILLARD BRICK WORKS COMPANY, 92 LIBERTY ST., NEW YORK. ORNAMENTAL TERRA-COTTA: NEW YORK ARCHITECTURAL TERRA-COTTA COMPANY.

particle of the steel covered and protected by terra-cotta. The body of the walls will be of hollow cubes of terra-cotta extending through the entire thickness of the walls, modelled on the exterior to the required design, and scored on the inside to receive the plaster, which will be applied directly to the terra-cotta, and be of a quality that will resist the action of fire and water. There will be no wood floors nor stairways; in fact, everything which can be made of fireproof material will be so.

The building, as before mentioned, will be twelve stories in height, and be in the French Renaissance style, very highly ornamented, and will contain all the modern improvements. Experiments are now being made by the architects, Messrs. Cope & Stewardson, and their engineer, Mr. Furber, in order to determine what kind of partitions will be most thoroughly fire and sound proof, with particular reference to the latter requirement. The drawings are now being made and the work of erection will begin about June 1.

LIMES AND CEMENTS,

MORTARS AND MORTAR COLORS.

AMERICAN PORTLAND CEMENT.

THE manufacture of high-grade Portland cement in the United States is really a new industry. For many years so-called Portland cement has been made in small quantities in Pennsylvania, but up to within three years a cement has not been made in this country that could compare in quality to the highest brands of German and French Portland cements. While we possess raw material in Pennsylvania and New Jersey much superior to the raw material found in Europe, it has been only recently that several American manufacturers, by carefully studying the subject, have discovered correct methods of making cement and of using their raw material to the best advantage. With the exception of such works, built within the last three years, manufacturers are greatly handicapped by the impossibility of applying correct principles, using, as they do, crude methods of calcination and a primitive mode of grinding. To keep up with improvements, and better the quality of their product, so many radical changes would be necessary that the cost would be even greater than in building new works. The English manufacturers, too, labor under this disadvantage. The Germans, on the other hand, engaging in the manufacture of cement much later, and profiting by the knowledge and experience of the English, constructed their works in accordance with correct principles. It may be, also, that the Germans, of a more scientific and technical turn of mind than the English, discovered details in the manufacture of Portland cement unknown to the latter. At all events, it stands as a fact, that English Portland cements in general are not to be classified with German Portland cements; there is a radical difference between the two. The English cements are coarsely ground, quick-setting, low in lime, and consequently not so strong; whereas the German cements are as a rule finely ground, slow-setting, and high in lime. These differences mean a great deal, both as to economy and strength in works of construction, as will be explained hereafter. On account of the superiority of German cements, doing so much more, better, and safer work, their price, as well as the demand for them, has increased, whereas the opposite is the case with English cements.

In the United States, there is an immense field for the manufacture of high-grade Portland cement, if the German methods are followed in every detail. The material found in the United States, especially in certain parts of Pennsylvania and New Jersey, is certainly superior to any yet discovered in Europe. At Whitaker, N. J., three miles east of Phillipsburg, on the Lehigh Valley Railroad, and sixty-four miles from New York, the cement rock deposit is very extensive. This rock is a slate marl, the analysis of which is as follows:—

Silica	14.44 per cent.
Alumina Sesquioxide of Iron	5.91 " "
Carbonate of Lime	75.17 " "
Carbonate of Magnesia77 " "

This deposit of rock was bored in several places to a depth of two hundred feet, with no change in the character of the rock, or in the analysis, and from a number of borings in various parts of the deposit the analysis of the rock averaged the same within a half of one per cent. Nature could not be more kind in her gifts to man, than in this Whitaker deposit. It is impossible to find a material more adapted to the manufacture of the highest grade of Portland

cement. The constituents of the rock are just in the proper amount and quantity to manufacture such a cement. This facilitates the process of manufacture, and guarantees the uniformity of the finished product, for it is not necessary, as it is elsewhere, to add lime to the raw material to get the proper proportions of component parts in the cement. The cement rock deposit of Pennsylvania runs low in lime, and to keep the finished product up to the proper amount of lime it is necessary to add limestone to the cement rock. It is a well-established fact that the limestones of Pennsylvania possess more or less magnesia; this, in quantities of over three per cent in the finished product, is exceedingly detrimental to the stability of Portland cement, causing disintegration. It is what a manufacturer abhors. In quantities of less than three per cent it does not affect in any way the quality of the cement. Even in the best limestone quarries it is difficult to separate stone running low in magnesia from that running high, and manufacturers who use limestone in connection with their rock cannot make as uniform cement as those who do not have to add the limestone. At Whitaker it never has been and never will be necessary to add limestone to the cement rock.

Possessing the proper material is a very great advantage, and, in fact, it is the basis of success; but it is not everything that is required to make the best cement. There are various processes of manufacturing Portland cement. The old method, or the "lime kiln" process, is very imperfect; yet considerable cement in Europe, and almost all in England, is made in this way, the kiln being an improvement on the lime kiln, but on the same principle. The Germans, however, have adopted the Portland draw kiln based on the Hoffman principle, which has produced most excellent results, and which is adapted to their raw material. Most of our domestic Portland cements are made with what is really a lime kiln,—improved, it is true, by increasing the height of the stack, making it more solid, giving it a better lining, etc., but the same in principle.

In manufacturing cement by this process the manufacturer first quarries his rock, adds chalk or lime in proportions, and grinds it as fine as possible. It is then placed in a pug mill and thoroughly mixed. This mixture is then made into a very stiff paste and moulded into bricks, which are dried artificially and then placed in the kiln, first a layer of coke and then a layer of bricks, and so on until the kiln is full. The contents are ignited and left to burn for a period of ten or more days, at the end of which time the contents are drawn out, coming from the kiln in a mixture. In brick manufacturing on the same principle it is well known that the light-burned brick are towards the side of the kiln, where the heat was less intense, and consequently brick throughout a kiln of this kind vary in color, hardness, density, etc., according to the position they occupied in the kiln. It is the same in the manufacture of cement; the properly burned clinkers are in the centre of the kiln, where the heat is the highest, and the under-burned stuff lies towards the walls of the kiln. When the contents are drawn it is necessary for men to pick out the properly burned clinkers, which are ground for the finished product of the highest quality. The under-burned stuff is usually ground, barreled, and sold for a second or third grade cement, and sometimes worked over again and reburnt. The effect of this process on the quality of the cement is very evident. First, it is impossible to separate all the

under-burnt stuff from the good clinkers; more or less of it *will* get in. These properly burned clinkers are in themselves all very large, sometimes as large as a barrel, and, being so large, considerable under-burnt stuff is distributed throughout them. The effect of this under-burnt stuff on the finished product is very detrimental. It contains the same amount of lime as the properly burned clinkers do, and as the object of calcination is to combine all the lime and silica and alumina, the more under-burnt stuff there is in the finished product, the more free lime there is in the cement, and consequently the weaker and more unsafe it is. While under this process one barrel of cement may be very good, another may be very bad; there is no uniformity.

Another disadvantage connected with this process is the inability to reach the high heat required to combine three parts of lime to one of silica. The best Portland cements show about sixty-two to sixty-three per cent of lime and twenty-one per cent of silica in the finished product, and the more perfectly the above amounts of lime and silica are combined, the greater the strength of the cement and the safer it is. This combination requires from three thousand to three thousand five hundred degrees of heat, and in a lime-kiln process it cannot be attained. Therefore those who use this process very generally decrease the amount of lime, and as the lime is decreased in the raw material the heat must be lessened, the principle being, the higher the lime, the higher the heat. Most American Portland cements are made by this process, and architects and engineers have looked upon them as unreliable and not uniform, they have so often tried them and found this to be the case. While the manufacturer using such a process may be honest in his efforts, he cannot succeed in attaining good results, for his methods are radically opposed to such results.

When works were constructed at Whitaker, N. J., the manufacturers were well aware of this fact, and, realizing that the age is progressive and that inferior cements must eventually go, and those of the highest quality remain and be established, they determined to go even farther than the Germans and manufacture a cement which could not be surpassed in quality by any cement in the world. The Germans admit that the dry process, or making it from the raw material ground to a finely powdered state, is the correct principle; but they have not as yet discovered a process by which this principle could be applied under the conditions they have. The rotary cylinder process used at Whitaker is especially adapted to the raw material found there, whereas in Europe it would not prove a success on a basis of economy. There the raw material is too bulky and refractory. Petroleum, which is the fuel under the rotary cylinder process, is too expensive for them. Where they have experimented with this process they have made the best cement, but it cost them too much. At Whitaker it is the cheapest, best, and most reliable process that can be used. The works were built several years ago and this process put in; since then a number of improvements have been discovered and adopted, making the process more successful than ever. The following is a description of it:—

The rotary cylinder is made of wrought iron, lined with best fire brick. It is forty feet long and about five feet in diameter. It revolves on its axis, on an incline, so that the raw material enters at a point higher than where the clinkers drop out at the end of the cylinder. The rock is taken from the quarries and always carefully analyzed, although this is not actually necessary, the rock being so uniform at all times. Yet this is an extra precaution used in the case of every batch of rock. It is then ground to impalpable powder, and passed from the grinding machine to the stock box at the head of the rotary cylinder. By a conveyor it passes into the cylinder from the stock box continuously. The cylinder revolves slowly on its axis. Petroleum, mixed with air, and ignited, is forced into the other end of the cylinder. This blast is continuous and heats the cylinder to three thousand five hundred degrees. The heat is easily regulated by increasing or diminishing the supply of oil. As the powder enters the cylinder and comes in contact with the heat all the carbonic acid gas is driven off through a stack connected with the top of the cylinder, and the powder gradually passes down, moved by the revolution of the

cylinder. As it proceeds it is subjected to severer heat, and, turning over and over, is all submitted to the same high uniform heat. Calcination and vitrification gradually take place, and the clinkers, forming, drop out at the end of the cylinder into a receiving chamber, where they are allowed to cool slowly, and when perfectly cool are ground to the finished product.

Under the old-style process as used in this country it takes fully ten days or more to make a barrel of Portland cement; under the rotary cylinder process it does not take over twelve hours. The advantages of the rotary cylinder process over every other process in existence are as follows:—

First. Every particle of the raw material is submitted to the same uniform heat, and consequently the clinkers coming from the cylinder are all alike in color, density, hardness, and state of vitrification, which results in making the finished product alike and uniform in every particular. If one barrel of cement is poor, all must be poor; if one barrel is good, all must be good, as all the clinkers are alike as they come from the cylinder.

Second. The heat is always under the full control of the manufacturer: he can lessen or increase it at his will. There is no other process in the world where this can be done so perfectly as in the rotary cylinder. Also, it is possible to attain a much greater heat than is necessary on account of being able to reach so high a heat that the lime can always be kept high in the cement, thus insuring a stronger finished product. It is for this reason that the rock at Whitaker is especially adapted to the rotary cylinder process, being high in lime and more thoroughly under a high heat.

Third. The clinkers are small in size, never larger than a bean, and consequently are uniform throughout and more easily handled and ground.

Fourth. If anything should occur to mar the quality of the cement, it can be discovered instantly and checked; whereas under the lime-kiln process it takes ten days to discover the results of a single burning.

I have tried to show why a cement manufactured under the rotary cylinder process, when proper material is used, as at Whitaker, for instance, is superior to any manufactured under any other process. I take it for granted, however, that, leaving out of the question where a Portland cement is manufactured, all engineers and architects are open to correction, and prefer to use a cement on their operations in which they have confidence and which they believe will do the best work. It must be admitted that there is a prejudice, and a very just one, against the use of American Portland cements for high engineering work for the reasons heretofore stated. It is, however, the aim of the Whitaker Cement Company to overcome this prejudice by conscientious effort, and they have certainly been very successful in whatever locality their cement has been used. Inquiry may be made why I discriminate so strongly against cements, though ordinarily good, in favor of some others. It is for this reason: There are some cements, correctly manufactured, which possess characteristics which I claim are the distinguishing features of a proper Portland cement, and which characteristics are essential to insure economy as well as stability in work. It is a fact conceded by every one that all Portland cements running from sixty-two to sixty-three per cent of lime and twenty-one per cent of silica, if hard burned, are stronger than others of lower amount of lime and lighter burnt. However, a cement running from sixty-two to sixty-three per cent of lime, and hard burnt, may have the strength, but under certain conditions not be able to manifest this strength. A cement of great strength, which is coarsely ground, will not show as great adhesive strength under scientific test as if it were finely ground. The finer a Portland cement is ground the greater are its adhesive qualities. The Portland cement of great strength, very finely ground, possesses one characteristic which distinguishes it from others not so strong or so fine. It will get its maximum strength in a much shorter time. This is nothing but ordinary common sense. The best portion of any cement is the hardest burnt portion, which is the most difficult to grind, and the impalpable portion of such cement has an intense affinity for the sand and stone in

mortar and concrete. It is known that with hard-burnt cements the residue on a No. 100 sieve has no setting qualities, and if this residue were ground much finer it would set, and exhibit more strength in setting, the finer it was ground. And if all the cement were ground to impalpable powder, it would take but a very short time for it to get its maximum strength, neat. It is a decided advantage when the hardening of the mortar is not too slow, because the structure is then placed, in a short time, beyond all dangers. In the works at Whitaker, this principle in manufacture is taken into consideration, and seventy per cent is guaranteed to pass through a 200 sieve, or forty thousand holes to the square inch. This seventy per cent is practically impalpable powder. An additional guarantee that not over ten per cent residue shall remain on a No. 100 sieve is made by the Whitaker Cement Company.

It is a most difficult thing to grind hard-burned cement finely. In England ordinary burr stones are used, and as a consequence the cement is very coarsely ground. In Germany the grinding is done by more improved machinery, and is finer; but at Whitaker the clinkers are ground in steel grinding machines which require great power and endurance. As a result, the Whitaker cement is exceedingly fine, and will attain its maximum strength, neat, in a comparatively short time.

If architects and engineers would reject all cements not meeting, under the hands of a competent tester, the following tests, all American manufacturers would be forced to put out a cement insuring better and more stable work, on an economical basis. The specifications I would recommend are these:—

1. The cement, neat, must stand a minimum tensile strain of four hundred pounds to one square inch section (briquettes one day in air and six days in water).
2. The cement, three parts of sand (standard crushed, quartz being used for testing) and one of cement, must stand a minimum tensile strain of one hundred and twenty-five pounds to one square inch section (briquettes one day in air and six days in water).
3. The cement must stand the boiling test, or test for safety. The test must be made as follows: Make a thick cake of neat cement,

allow it to set hard in air, twenty-four hours, then immerse it in boiling water, and keep this water up to 212° Fahr. for twenty-four hours. At the end of twenty-four hours, if the cake shows no sign of disintegrating or cracking, it has passed the boiling test.

4. The cement must pass the following test for fineness: There shall be only two per cent on a No. 50 sieve, ten per cent on a No. 100 sieve, and thirty per cent on a No. 200 sieve.

5. An experienced, capable man shall do the testing.

A cement standing, in every particular, the above specifications, is much more economical than one which does not, and I would recommend, in concreting for heavy buildings, using such a cement, the following proportions: One part cement; four parts sand (coarse, sharp, and free from all loam); seven parts broken stone (clean from all dirt). For mortars, I would use one part of cement to three parts of clean, sharp, and coarse sand, with the addition of a very little cold and thoroughly slacked lime. One part cement, four of sand, and a very little lime—just enough to give plasticity to the mortar—would give most excellent results.

Of course, in the use of large proportions of sand and broken stone in concreting, and the use of large quantities of sand in mortar, it is necessary to be most careful in the mixing. In making the concrete, it is well to use as little water as possible, and to carefully ram the concrete until it sheds water. The concrete, when set, will then harden very rapidly, using the quality of cement recommended. It is false economy to buy cheap cements and use more in the concrete or mortar. Better and more stable work would be attained, and cost less, by using larger proportions of broken stone and sand, with a high-grade cement meeting the foregoing specifications. It is highly important, to insure success, that the best quality of broken stone and sand be obtained, and that the work be done properly.

I trust this article may be read with interest by architects, engineers, and builders, and that it may induce them to recommend or use the best of Portland cements for their work, which I know they will find will give them more satisfactory and economical results.

WM. J. DONALDSON.

(See Editor's note on following page.)

The Alpha Portland Cement.

Its superiority is fully established; for fineness, uniformity of color, and great tensile strength it is unexcelled. Every barrel of "ALPHA PORTLAND CEMENT" guaranteed equal to the very best brands of "German Portland Cements," and its minimum tensile strength guaranteed as follows:

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GUARANTEE.			
1 day in air, 6 days in water,	-	-	400 lbs.
1 " " " 27 " " " "	-	-	500 " "
1 " " " 3 months in water	-	-	600 " "
3 parts of sand to 1 of cement—Adhesive test.	-	-	-
1 day in air, 6 days in water,	-	-	125 lbs.
1 " " " 27 " " " "	-	-	175 " "
FINENESS.			
Residue on sieve No. 50,	-	-	None.
" " " 100,	-	-	10 per cent.
Passing through sieve No. 200,	-	-	65 " "
Every barrel guaranteed to stand the boiling test, the test for safety.			

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Guaranteed to stand all required tests.

115 Broadway, NEW YORK.

WE think it is only fair to Mr. Donaldson, and to the cement he has done so much to bring up to its high quality, to state a fact which he has modestly omitted from his article, but which is of interest to all who have read it. Then, too, perhaps we can say it with better grace than Mr. Donaldson. The cement manufactured by the process he describes is the Alpha Portland cement, made by the Whitaker Cement Company. Mr. Donaldson, whose office is in the Betz Building, Philadelphia, is the general agent for this cement, and here in New England it is handled by James A. Davis & Co., corner State Street and Merchants' Row, Boston.

(For further cement notes see page xii.)

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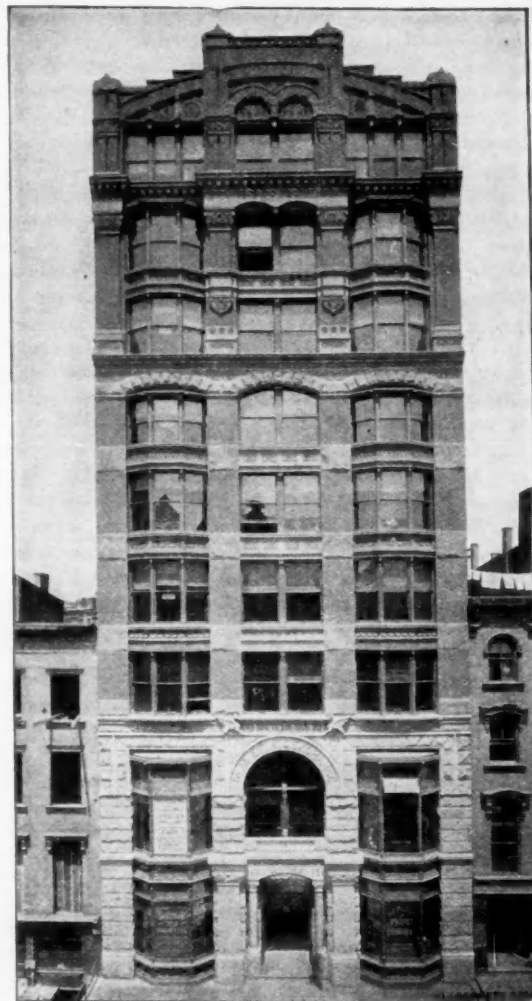
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THE MANUFACTURER.

A Department devoted to the Market Side of Clay Production.

INTRODUCTION.

THE manufacturing side of the clay-working business is already well taken care of by several periodicals. The market side, previous to the publication of THE BRICKBUILDER, has been neglected. It is the purpose of this paper, from cover to cover, to advocate the use of clay-building materials, and, by presenting their merits in every conceivable way, induce owners, architects, and builders to use them wherever possible to the exclusion of other materials. THE BRICKBUILDER will, in short, use every legitimate means to increase the consumption of brick, tile, and terra-cotta. Its success in this direction means more business for the manufacturer, necessitating more and better machinery, and greater drier and kiln capacities. It means the establishing of new yards where there are none at present. We therefore expect the hearty support and co-operation of every clay-worker and every manufacturer of brickyard equipment who wishes to see a larger and more general use of clay products. The columns of this department are open to the discussion of all questions relating to the market side. Every manufacturer who has a suggestion for *selling more brick* should put it into these columns. We especially request clay-workers to subscribe to, read, and write for our paper. Its success as an advocate of architecture in clay materials directly benefits every one interested in clay-working.

TWO LETTERS.

TO THE EDITOR OF THE BRICKBUILDER:—

Sir,—The writer first wishes to congratulate you on the neat appearance, mechanical excellence, and general make-up of your publication, which will surely be appreciated by brickbuilders as well as brickmakers. If your publication causes better brickwork, the brickmaker is benefited; the more attractive we can make brick walls, the more demand there will be for them. There are two essential features necessary for a handsome brick structure: first, there must be bricks perfect in shape, uniform in color, with well-finished surfaces; second, they must be skilfully laid in the wall. To accomplish this result, there must be harmony between the brickmaker and the brickbuilders. Brickmakers have publications representing their interests, brickbuilders have their interests represented through your periodical; through these mediums the manufacturer and the builder can compare notes, which must prove mutually beneficial. The great question with both is how to increase the demand for brick for all purposes. In your article in March number you give the brickmaker sound advice, saying, "He should use every legitimate means to secure the use of brick wherever it can be substituted for other material." The builder should do likewise; he should post himself on the advantages of brick over other articles as a building material, especially over wood. A brick building is more durable; it is cooler

in summer and warmer in winter, with walls properly ventilated by spaces for circulation of air between the outer and inner courses of brick; it is as dry as wood; it is in less danger from fire, hence insurance rates are less; it saves painting. These are some of the points to make in the argument for brick walls. Again, people ought to be convinced of the fact that they can have a brick wall trimmed with stone, terra-cotta, and fancy patterns of moulded brick, that cannot be surpassed for artistic beauty by any other material. Articles on the lines of that referred to in March number will result in great good to our business. We do not advertise the merits of our wares as others do in other lines.

The demand in the Southern States for well-made bricks is increasing. Most buyers want all hard bricks. This necessitates the purchase of better machinery and the construction of improved kilns for burning all hard, sound bricks. No broken or damaged bricks are sent to buildings in this section. They must be all whole. For face bricks there is a growing demand for dry-press bricks. This is being met by manufacturers putting in the best dry-press machinery. There is also considerable inquiry for roadway pavers, or annealed bricks. This demand will no doubt soon be met by enterprising brickmakers. There are now signs of increased activity in building material, which, of course, has been dull for twelve months past. Most of the large plants ship their product to market by rail.

R. B. MORRISON.

Rome, Ga.

TO THE EDITOR OF THE BRICKBUILDER:—

Sir,—You have been kind to me in sending your very excellent journal, which in its line has no equal, that I am aware of. Brick building, in all its forms, principles, practice, and economic interest, is the most important industry that concerns the growth, welfare, social and pecuniary interest of our cities.

Utility, strength, health, and protection against fire are the greatest considerations. These are the factors with which you are to deal, I think, with the most special care. It is true that architectural elegance and beauty must not be overlooked, but no amount of elaborated adornment in the exterior construction of buildings will in any reasonable degree compensate for ill-proportioned buildings or walls, or inferior materials or workmanship. I have no space here to discuss this subject, and it may look like presumption for me to say that about all true principles of building up cities are either ignored or violated. If I cannot show this fact in a few short articles, I will take a "back seat," and acknowledge that I don't know what I am talking about. I trust that THE BRICKBUILDER will take up this important subject and find more able help than I could give in its discussion.

I am very truly yours,

J. W. CARY, SR.

Bluff Springs, Fla.

The two foregoing letters are gratifying evidences that our remarks on the market side, in last month's issue, struck home in two instances at least. Every word of Mr. Morrison's communication is solid common sense, yet there are thousands of clay-workers to whom his way of looking at the subject has never occurred. His statement that "if THE BRICKBUILDER causes better brickwork the brickmaker is benefited," only half covers the ground. We are working not only to cause better brickwork, but more of it. We want to see towns and villages as well as cities built of brick. We want to see brick dwellings, brick churches, brick schools, brick stables, as well as brick stores, instead of stone or frame structures. Further, we want to see brick walls replace wooden and iron fences, brick in our pavements replace cedar block, asphalt, or stone, brick sidewalks, and, in short, a brick everywhere it can satisfactorily meet the requirements of its position. We ask any brickmaker to look about him and see what might have been done in brick, but was not. Mr. Morrison says brickmakers have publications representing their interests. We want to correct this by a statement that no publication more than half represents their interests, and there is only one,—THE BRICKBUILDER, representing by far the more important portion of their interests; for we hold that the market side of any industry is the all-important side. Give an industry a market, and the processes of manufacture will be met; but without that market no process is of the slightest value. This is so self-evident, and is so clearly proven every day of history, by the shutting down of works when the demand for their goods ceases, that it seems needless to dwell upon it for a moment. But it shows that the market is the key to the whole situation. Upon it depends the operation of existing plants, and the equipment of new ones, and, consequently, every sale of brickyard machinery or equipment. To try and increase this market is the mission of THE BRICKBUILDER—to cover the portion of the brick manufacturer's business upon which depends directly every other portion covered by the journals devoted to manufacturing processes.

The increase in the market for clay goods depends largely upon the users, not the makers, of these goods. The owner who erects a building, the architect who designs it, the contractor who builds it, are the parties upon whom the selection of material depends. THE BRICKBUILDER works to increase the demand for brick by placing arguments in its favor directly before the building classes, and also by placing at the disposal of the manufacturer a weapon to use in counteracting the influence of the several papers used by wood-workers. By showing what the leading American architects are constantly doing in successfully using clay materials, through the publication of photographs, sketches, and working drawings, and by publishing examples of the best historical work in Europe, together with strong articles advocating brick and terra-cotta work, we are each month distributing, in rapidly increasing numbers, a series of convincing arguments, proving that the materials *you*, the manufacturers, produce are the best for building purposes, not only for construction pure and simple, but for artistic effect. Is such work as this not worth your co-operation? Is it not *resulting* directly to your advantage?

ORNAMENTAL BRICK WALKS.

WHEN two or three shades of brick are obtainable that are of the same hardness so that they will wear uniformly, a very handsome walk can be laid following the same class of designs so successful in tile floors. When all these colors are not of the same hardness, by selecting the hardest for the centre of the walk, which is to be kept plain, and laying the three colors to produce a border design, the wear on the sides will not be sufficient to seriously affect the walk. This especially applies to a walk from the house to the street. There is an infinite number of ways in which such a walk may be laid with the use of only two shades of brick. Such a walk, with a well-designed front wall, would be exceeding effective, in connection with a fine brick residence.

CLAY-WORKING LITERATURE.

THE importance of the clay-worker as a factor in building operations is slowly but surely being recognized. Heretofore his connections with the art of building have been in the main incidental, but within the past twenty years the few simple and somewhat crude examples of his lack of skill have been crowded to the rear, and their place supplied by a larger variety of more beautiful and useful evidences of his progress. Even the common building brick of twenty years ago has been replaced by a better-appearing and much more durable and serviceable article, and the quality of all building material manufactured from clay is constantly being improved. The science of preparing and mixing clays, unknown a comparatively few years ago, while yet in its infancy, has borne its full part in the evolution of clay-working, and no branch of the clay-working industry is receiving more careful consideration than is being given to this branch of the business. The civilization of the last half of the nineteenth century has demanded that more attention should be paid to the æsthetic, and that buildings should be erected which, without detracting from their strength, durability, or usefulness, should be more pleasing to the eye. To this demand the architects of this and previous generations have royally responded. Their efforts to satisfy the taste of the cultured of this age have taxed the resources and ingenuity of the progressive clay-worker, and to them the world owes its tribute for a class of buildings more beautiful and pleasing than those of any other country or previous era. The artistic combination of colors and shapes, which can now be produced with brick and terra-cotta in this country, is the evidence of the growth of the clay-worker's art, and will for ages be the monument of those who have aided in its development. But the student who endeavors to obtain, from the literature of the clay-worker, information to guide and direct his research, and to assist him in obtaining a technical knowledge of the art, finds his efforts completely balked. Acknowledged by all to be the oldest of the arts, the methods and processes of mixing, forming, and burning clay have for centuries been transmitted from father to son, from one artisan to another, with scarcely a written word to assist the ambitions of the earnest seeker for a better way, or to record the mistakes of his predecessor. No college or educational institute in the world has ever yet given any prominence to this art, which is still in its swaddling clothes, but which has for so long been an important factor in the world's history. Very many branches of study, a knowledge of which is absolutely necessary to the modern clay-worker, are, it is true, taught in all our colleges and universities; but the text-book which shall teach the proper application of the knowledge thus obtained, to the conversion of Mother Earth into articles of use and beauty, has not yet been published. The first works which have been written or compiled are in the main unreliable, largely because they are out of date. The development of the art has been too rapid for its historian to keep pace with it. Another, and perhaps the prime, reason for the lack of printed data on so important a subject is that within a few years the manipulation and burning of clay were considered as an avocation requiring brawn and muscle rather than an art or profession needing brains and intelligence. To-day the clay-workers, as a class, compare favorably with other manufacturers. Among them can be found many men of superior intelligence and attainments, whose practical training, added thereto, has enabled them to reap the reward they so richly deserve. The necessity for knowledge is rapidly asserting itself, and the clay-worker of the future will have a thorough practical training in chemistry, geology, and physics. He will, in addition, be a practical machinist of no mean order. Speed the day when from the public and private libraries of this country can be obtained information necessary to the success of the clay-worker. Hasten the time when an ambitious young man or woman can graduate from our high schools or colleges, with an education that will entitle them to membership in the ranks of clay-workers deserving of the name.

D. V. PURINGTON.

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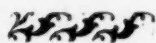
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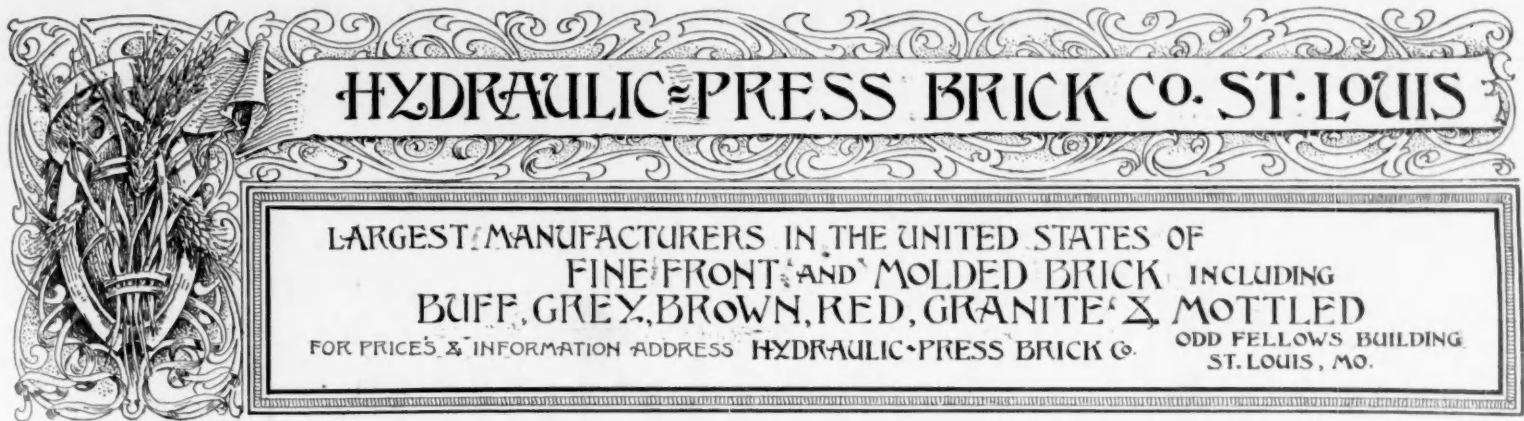
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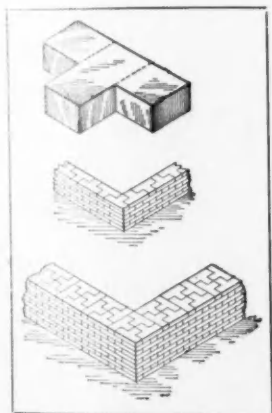
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